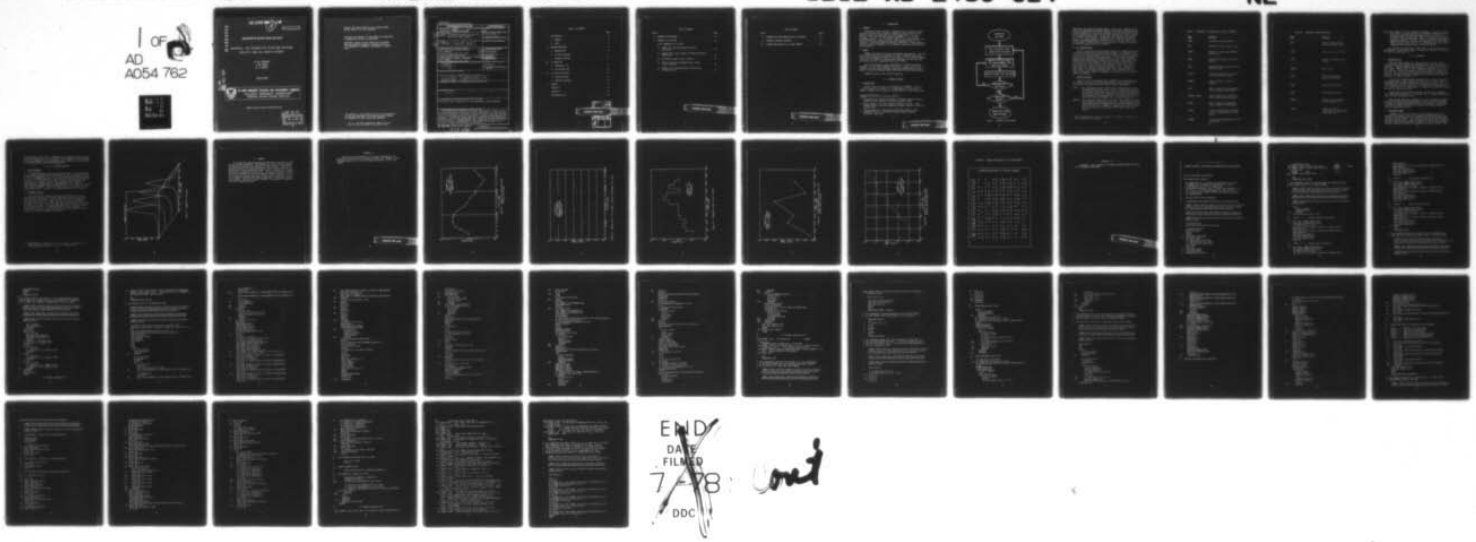
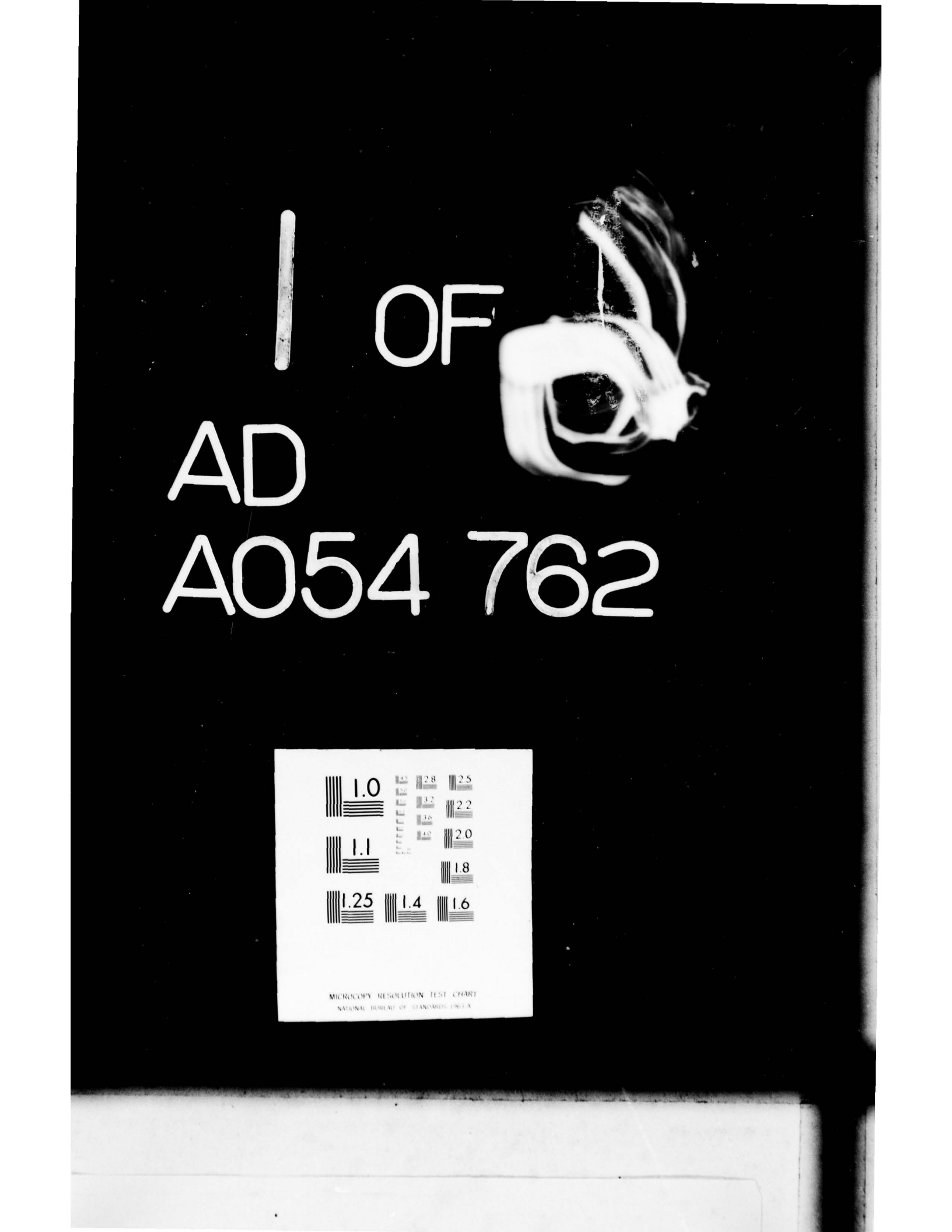
AD-A054 762 ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND ABERD--ETC F/G 9/2
INTERPOL: AN INTERACTIVE PLOTTING PACKAGE FOR OFF-LINE CAL COMP--ETC(U)
MAR 78 R M SCHWENK, J W KINCH, A E RAINIS

UNCLASSIFIED ARBRL-MR-02818 SBIE-AD-E430 024 NL

1 OF
AD
A054 762



END
DATE FILMED
7-78
DDC


1 OF
AD
A054 762
1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

MEMORANDUM REPORT ARBRL-MR-02818

INTERPOL: AN INTERACTIVE PLOTTING PACKAGE FOR OFF-LINE CAL COMP SYSTEMS

R. M. Schwenk
J. W. Kinch
A. E. Rainis

March 1978

US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
BALLISTIC RESEARCH LABORATORY
ABERDEEN PROVING GROUND, MARYLAND

Destroy this report when it is no longer needed.
Do not return it to the originator.

Secondary distribution of this report by originating or sponsoring activity is prohibited.

Additional copies of this report may be obtained from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

The use of trade names or manufacturers' names in this report does not constitute indorsement of any commercial product.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: MEMORANDUM REPORT ARBRL-MR-02818 (14)
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER (9)

4. TITLE (and Subtitle) (6): INTERPOL: AN INTERACTIVE PLOTTING PACKAGE FOR OFF-LINE CAL COMP SYSTEMS.

5. TYPE OF REPORT & PERIOD COVERED: Final rept.,

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s) (10): R. M. Schwenk, J. W. Kinch, A. E. Rainis

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS
US Army Ballistic Research Laboratory ✓
ATTN: DRDAR-BLV
Aberdeen Proving Ground, MD 21005

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS (16): 1W162118AH75

11. CONTROLLING OFFICE NAME AND ADDRESS
US Army Armament Research & Development Command
US Army Ballistic Research Laboratory
ATTN: DRDAR-BL
Aberdeen Proving Ground, MD 21005

12. REPORT DATE (11): MARCH 1978

13. NUMBER OF PAGES: 52

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) (12) 45p.

15. SECURITY CLASS. (of this report): UNCLASSIFIED

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

(18) SBIE (19) AD-E430 024

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

4 The INTERPOL (Interactive Plotting for Off-Line systems)

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

PLOTTING, Cal Comp, INTERACTIVE I/O, TWO-DIMENSIONAL, THREE-DIMENSIONAL

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A program has been written to incorporate the necessary routines required for general purpose two-dimensional and three-dimensional (x,y) data plotting. The interactive format of the program reduces the typical three-step planning, writing, and debugging process to an efficient, single-step question and answer execution. The plotting routines employed are standard Cal Comp FORTRAN subprograms for off-line Cal Comp pen plotters. Driver routines and miscellaneous I/O routines all use standard FORTRAN. This program may be used with TTY and CRT type terminals. Foreknowledge of computer plotting techniques is not necessary, although some experience may be helpful.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

393 471

4

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

A. Purpose

A program has been written to incorporate the necessary routines required to provide more expedient computer plotting capability for general purpose two dimensional and three dimensional (x,y) data plotting. The intent of this program, INTERPOL*, is to minimize programming effort. The interactive format of the program reduces the typical three-step planning, writing, and debugging process to an efficient, single-step question and answer execution. Foreknowledge of computer plotting techniques is not necessary, although some experience may be helpful.

B. Scope

INTERPOL was written for use on the UNIVAC 1108 computer. The plotting routines employed are standard Cal Comp[1-3] FORTRAN subprograms. Driver routines and miscellaneous I/O routines all use standard FORTRAN. Conversion of INTERPOL to other machines employing off-line Cal Comp pen plotters can be accomplished with little effort.

Use of this program is most advantageous with CRT time-sharing terminals, but TTY type terminals may be used. Length of execution is dependent on time-sharing response, number of graphs generated, and amount of data processed per graph (the former of these being dominant).

INTERPOL requires ∿30K of UNIVAC 1108 core.

II. PROGRAM STRUCTURE

A. Problem Flow

Figure 1 shows the basic flow structure for INTERPOL. The user is first asked for the logical unit number upon which the digital graphic commands will be written. The pen plotter is then initialized

---

Interactive Plotting for Off-Line Systems

1. *"Programming Cal Comp Pen Plotters", California Computer Products Phamphlet 1006A, Anaheim, California, September 1969.*
2. *"User's Manual", Cal Comp Graphics Functional Software - USAS FORTRAN General, California Computer Products, Anaheim, California, November 1968.*
3. *"User's Manual" Cal Comp Graphics Functional Software -USAS FORTRAN/Scientific, California Computer Products, Anaheim California, July 1969.*

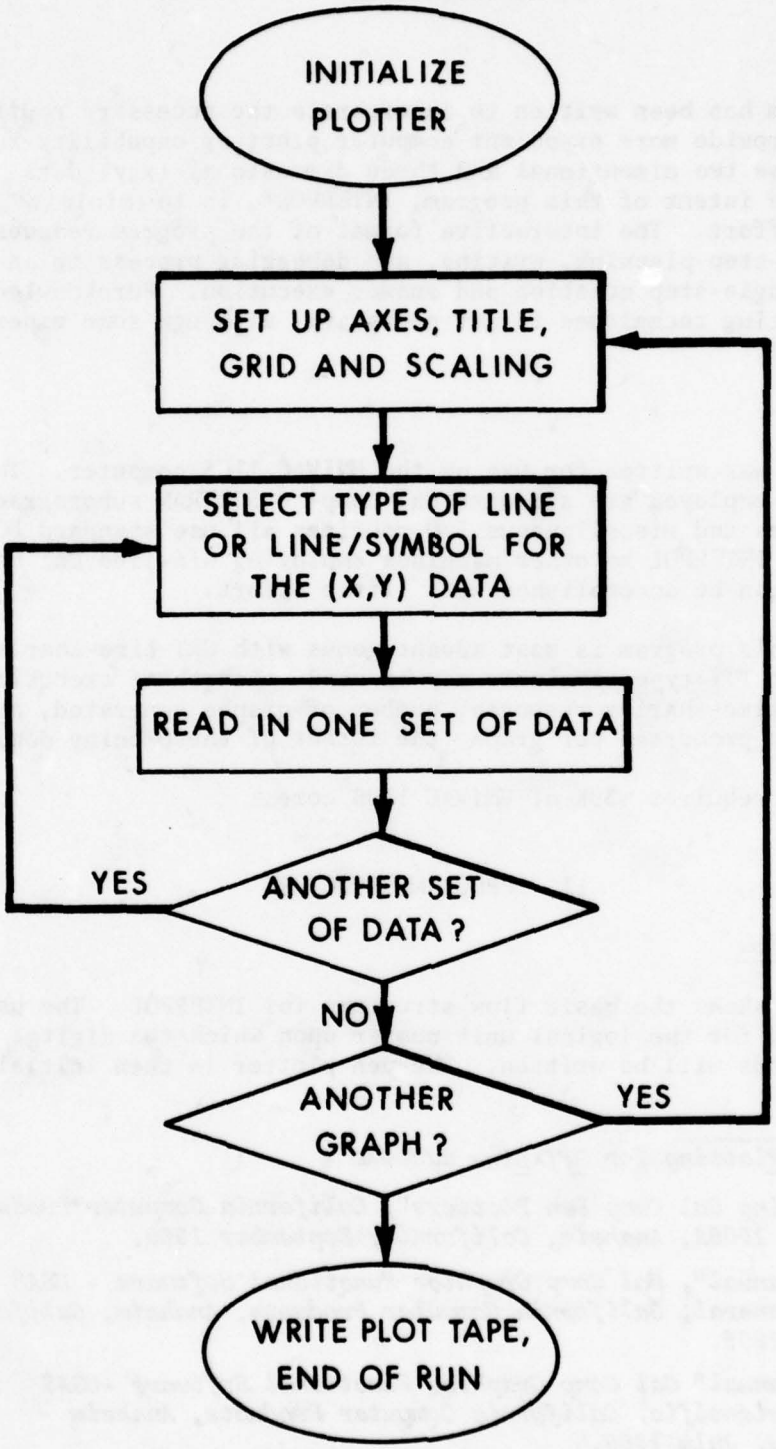


Figure 1. INTERPOL Flow Diagram

accordingly and problem execution begins. Each run is comprised of two loops; one controlling the general design of the graph (two dimensional or three-dimensional, title, axis labeling, scaling, and grid); and the other controlling the display of the data (type of line, type of symbol, or line/symbol combination). The user has the opportunity to change any, or all, input parameters within each loop, thereby changing the design of successive graphs or representation of the data sets at will. In this manner INTERPOL allows for multiple sets of data on one graph and multiple graphs during one execution.

B. Cal Comp Routines

Table I lists the Cal Comp routines employed by INTERPOL along with a brief description of the function they perform. The arguments used in the call to these routines are all set internally, based on the user's selection of the graphic design parameters. The routines provided are among the most generalized available from Cal Comp. Specialized subprograms which draw specific figures or curves were intentionally omitted in order to keep INTERPOL as efficient as possible for plotting (x,y) data only. Thus, the user has available to him linear, semi-logarithmic, or log-log scaling, with smooth line fit, straight line point connection, dashed line point connection, symbols printed at points only, or line/symbol combinations. This is adequate for most graph applications (examples in Appendix A) and keeps the user-supplied input at a minimum.

C. INTERPOL Routines

Table II lists the routines used by INTERPOL to provide the interface between the user and the Cal Comp software. Brief descriptions are given in the table but several require further explanation.

TITLE -- This subroutine prints a title block if requested by the user. It provides up to five lines of script, 25 characters per line. The user may position the title block anywhere on the graph by specifying an upper left coordinate (i.e., where the first line is to begin)*. At its maximum, the title block size is approximately 3.5 inches horizontally by 1.5 inches vertically.

NUGRID -- This subroutine draws either a vertical, horizontal or vertical and horizontal grid pattern on the plot. The increment of each line along an axis is dictated by the scaling of the data (tick marks) for that axis. NUGRID is compatible with TITLE in that the lines drawn will not intersect the script of the title block.

*This coordinate is an (x,y) point, in inches, relative to the origin of the graph.

Table I. Standard Cal Comp Routines Used by INTERPOL

NAME	FUNCTION
PLOTS	Initializes the pen plotter.
PLOT	Establishes origin; draws a line.
FACTOR	Expands or reduces pen movements (plot size).
SCALE	Scales data linearly to fit pen plotter.
AXIS	Creates linearly scaled axis with Hollerith label.
LGAXIS	Creates logarithmically scaled axis with Hollerith label.
SYMBOL	Draws a symbol or string of symbols.
LINE	Draws a straight line connecting a set of linearly scaled points.
DASHLN, DASHPT	Draws a dashed line connecting a set of linearly scaled points.
FLINE	Draws a smooth fit connecting a set of linearly scaled points.
LGLIN	Draws a straight line connecting a set of logarithmically scaled points.
SCALOG	Scales data logarithmically to fit pen plotter.

Table II. INTERPOL Interface Routines

NAME	FUNCTION
INIT	Initializes pen plotter and sets up graph origin.
TITLE	Writes graph title block.
FACTR	Reduces or enlarges size of of plot.
NUGRID	Draws a grid.
PLOTR	Plots all data and/or generates histograms.
AXES	Draws and labels axes.
MAIN	Main program control.
READR	Inputs all data, handles all interactive I/O.
FIXUP	Checks for zeros in logarithmically scaled data. (See Section III.A)

PLOTR--This subroutine is the backbone of INTERPOL. All data is plotted from PLOTR. An option available with INTERPOL which allows for histogram generation based on single sets of (x,y) data (i.e., a new set of data is calculated to enable a histogram style plot to be drawn) is handled via PLOTR. Also, since the Cal Comp routines DASHLN and FLINE will not work with logarithmically scaled data, PLOTR re-scales these values (if in logarithmic mode) so as to be compatible with the dash line or smooth fit options.

All routines are marked with comment cards to aid in following the programming or instituting changes. A complete FORTRAN listing can be found in Appendix B.

III. I/O HANDLING

A. Interactive I/O

Subroutine READR handles all program requests and user replies. Each question is self-explanatory and supplies the user with a choice of responses. INTERPOL precedes each question with a double arrow(">>") for clarity. Where a "YES" or "NO" response is applicable, a "Y" or "N" will suffice. Every input (except for Hollerith data) is checked for an error, and, if found, notifies the user accordingly and repeats the question. Warnings or general information not requiring user input are preceded by a double asterisk ("**").

All data to be plotted must be presented in (x,y) pairs using free form (open) format. While entering any data which is to be scaled logarithmically, INTERPOL checks each (x,y) point for zeros. If a zero is encountered, the zero is reset to the lowest value of the data set (i.e., the lowest x or y value input). A warning is then printed telling the user this action was taken.

Several questions have default answers and the user is supplied this information as necessary. Entering a zero, or transmitting a blank line, will set the default value.

Upon problem completion, INTERPOL will write the number of graphs generated and compute the maximum height (y axis length) encountered. A message is printed notifying the user of any paper size restrictions. A final note reminds the user of the logical unit number upon which the plot records were written.

B. Plot-Record Tape

INTERPOL is written for off-line Cal Comp magnetic tape units. Therefore, the specific device or procedure for generating these tapes may vary with installation. The records written on the selected logical unit, however, are all that are necessary to drive the pen plotter. Whether written directly on tape or copied to tape from mass storage is strictly a matter of procedure as defined by the user's system. (The

current UNIVAC 1108 version of INTERPOL will dynamically assign a temporary mass-storage file "29", by default, if so requested. This may then be copied to magnetic tape as mentioned above, and/or copied to a permanent catalogued file upon problem completion).

IV. 3-D PLOTTING PACKAGE

A. Tracor Routines

A three-dimensional plotting routine developed by Tracor Computing Corporation[4] was modified and incorporated for use with INTERPOL. Briefly, the 3-D package reads sets of (x,y) data and successively steps each set in a Z, or depth direction. Any portion of data which falls behind a previous set is either not plotted, or plotted with a dashed line (thus giving a "hidden" effect). Two subroutines govern the calculation of the maximum and/or minimum function (i.e., "seen" vs. "unseen" data), HIDE and LOOKUP. HIDE is the main routine and contains the Cal Comp software calls. Figure 2 is a representation of the 3-D option.

B. INTERPOL Interface

Due to the special nature of the Tracor routines the 3-D capabilities are a bit more restrictive than those previously described, but follow the same format. Only a single line title is permitted (placed above the plot). Linear, semi-log, and log-log scaling is available. Only the x and y axes have labels and tick marks, the depth axis does not. There is no grid capability. Dashed lines are reserved for "hidden" data only. Histogram generation is not provided. To maintain versatility, the user is capable of switching from 2-D to 3-D and back as successive graphs are generated.

4. *Hugh Williamson, "Hidden Line Plotting Routine (Algorithm 420)", Communication of the ACM, Vol 15, No. 2 February 1972.*

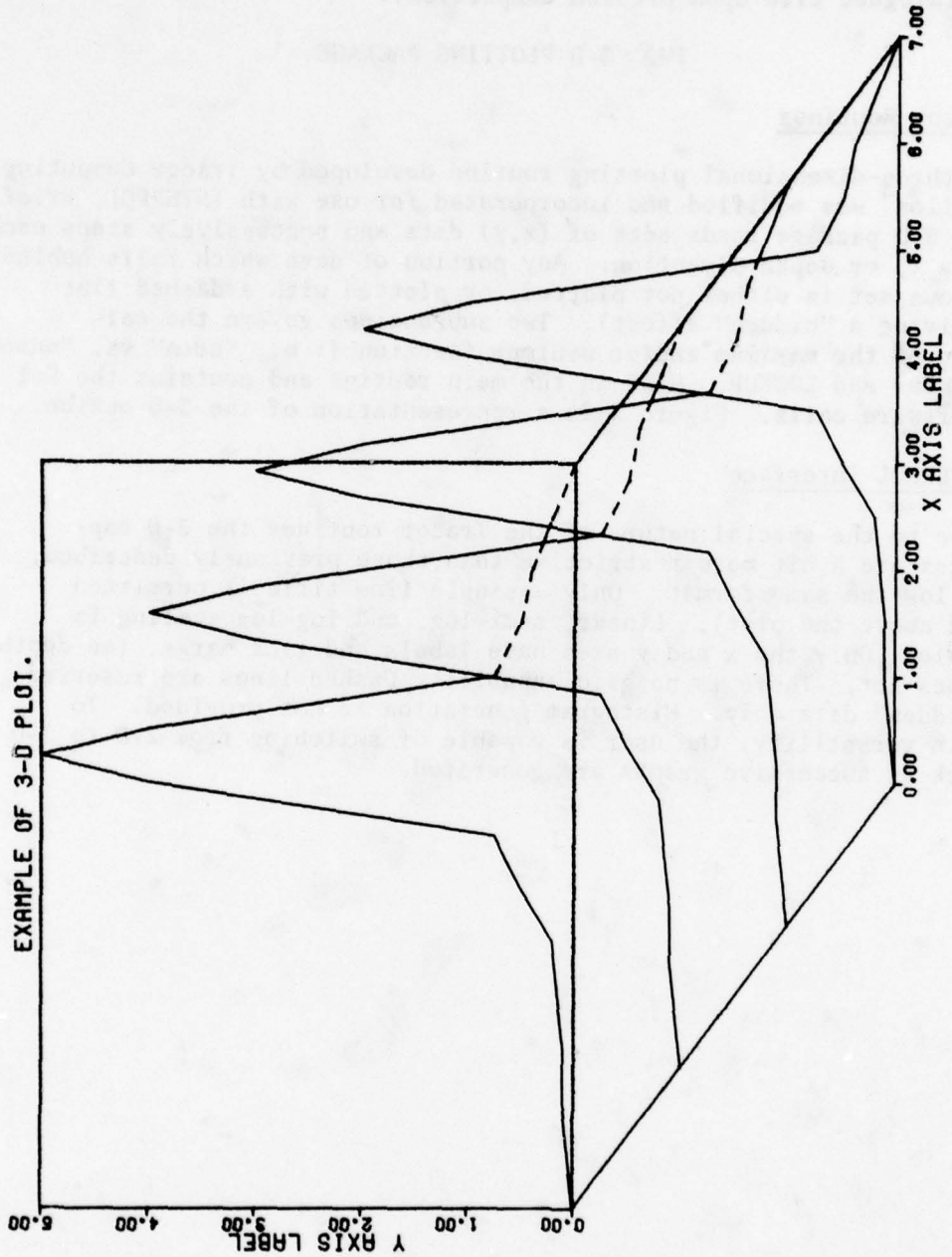


Figure 2. Example of 3-D Option

V. SUMMARY

An interactive computer program for plotting on off-line Cal Comp systems has been developed. The program acts as an interface between user specified requests and standard Cal Comp software. Execution is designed primarily for generating graphs of (x,y) data in typical two dimensional or three dimensional form. Input is handled via a question and answer conversation with the user. As such, an efficient, simple and versatile method of generating computer graphs, negating the need for writing special programs on a case by case basis,is provided. Little or no computer plotting experience is required to successfully execute this program. Written in standard FORTRAN, this program is compatible with most computing machines.

APPENDIX A

Contained in this appendix are five plots (Figures A1 - A5) depicting a cross-section of options available with INTERPOL. Also included (Table AI) is a list of integer equivalents of Cal Comp symbols.

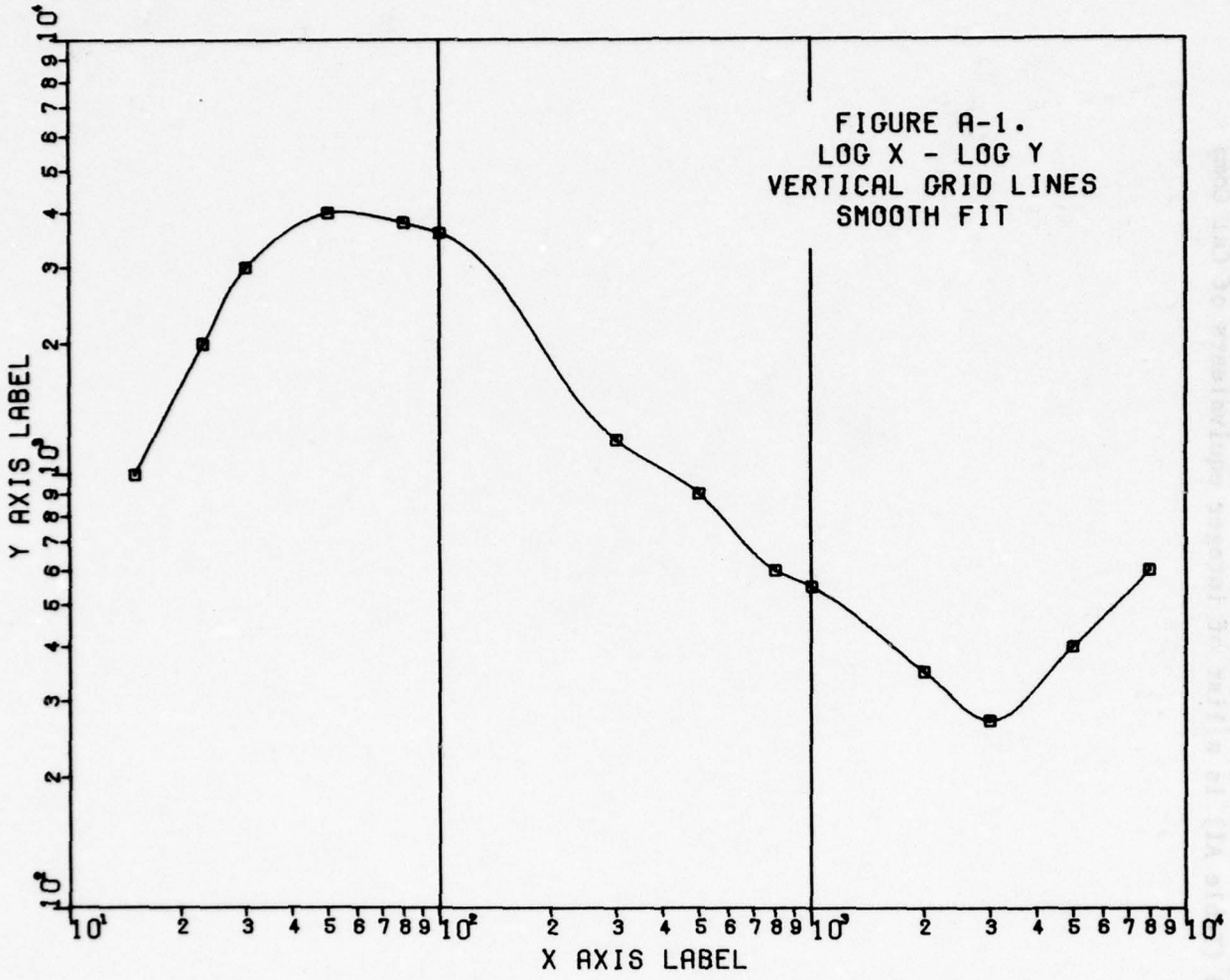


Figure A1. Smooth Fit, Log-Log Scaling, Vertical Grid Lines

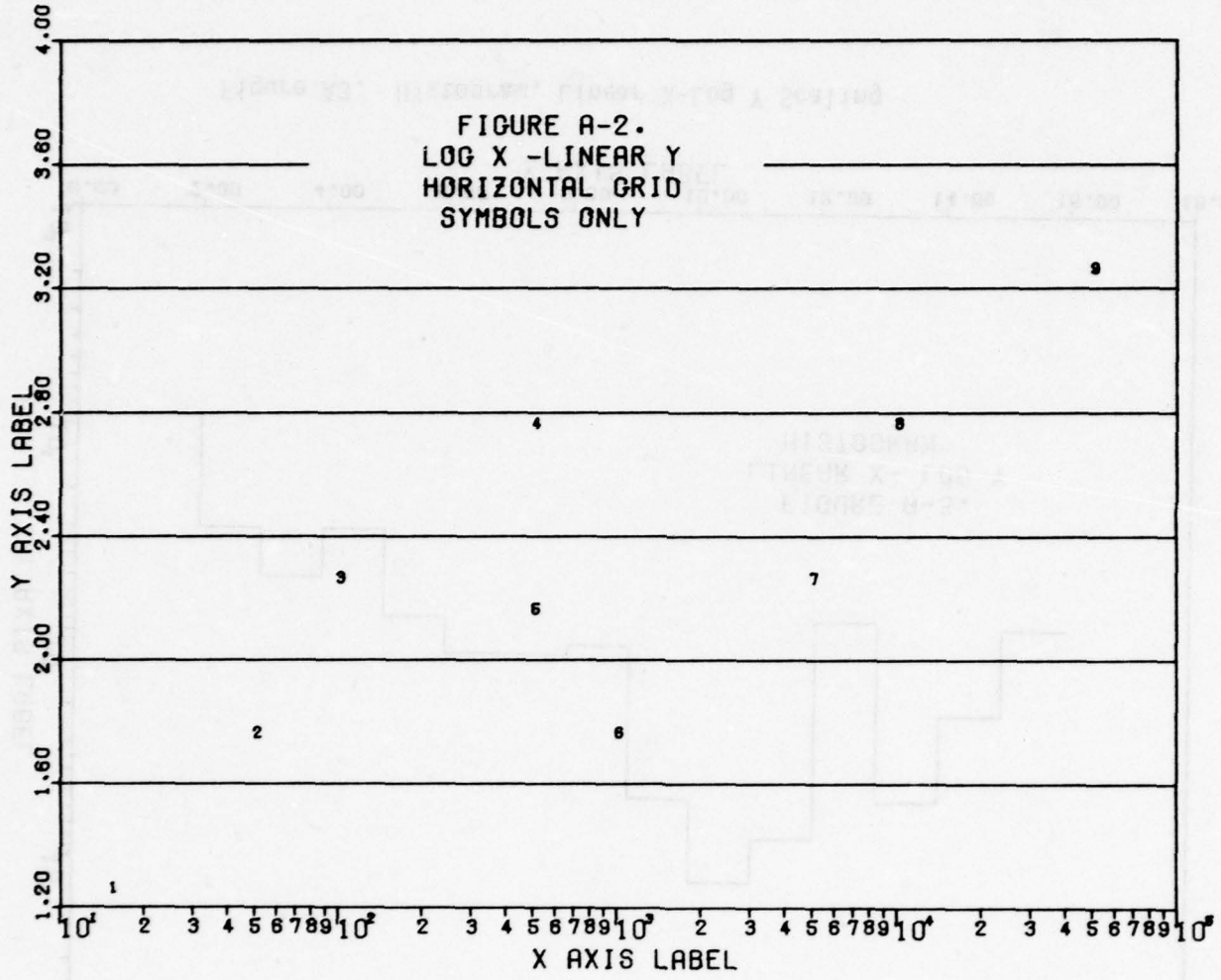


Figure A2. Symbols Only, Log X-Linear Y Scaling, Horizontal Grid Lines.

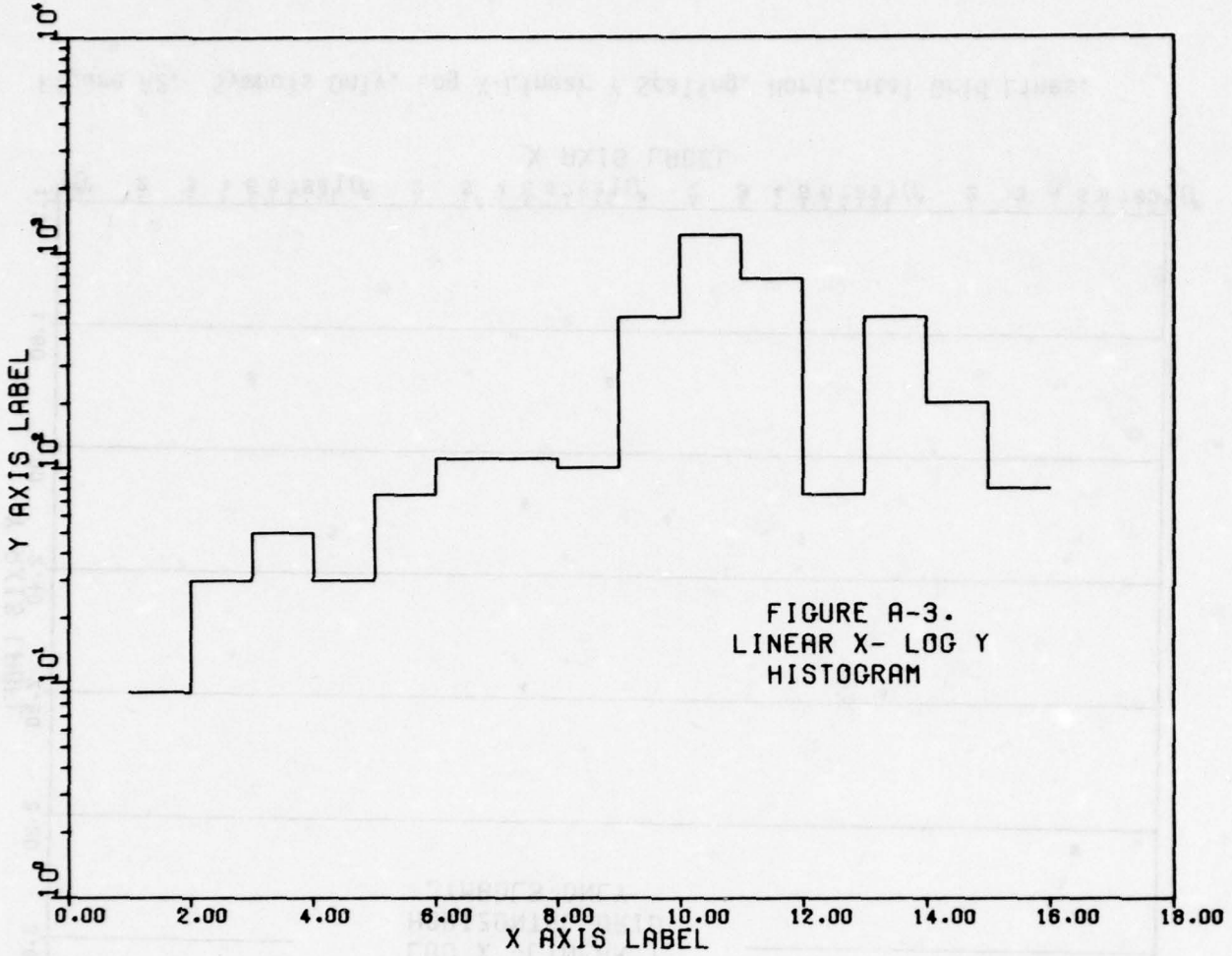


Figure A3. Histogram, Linear X-Log Y Scaling

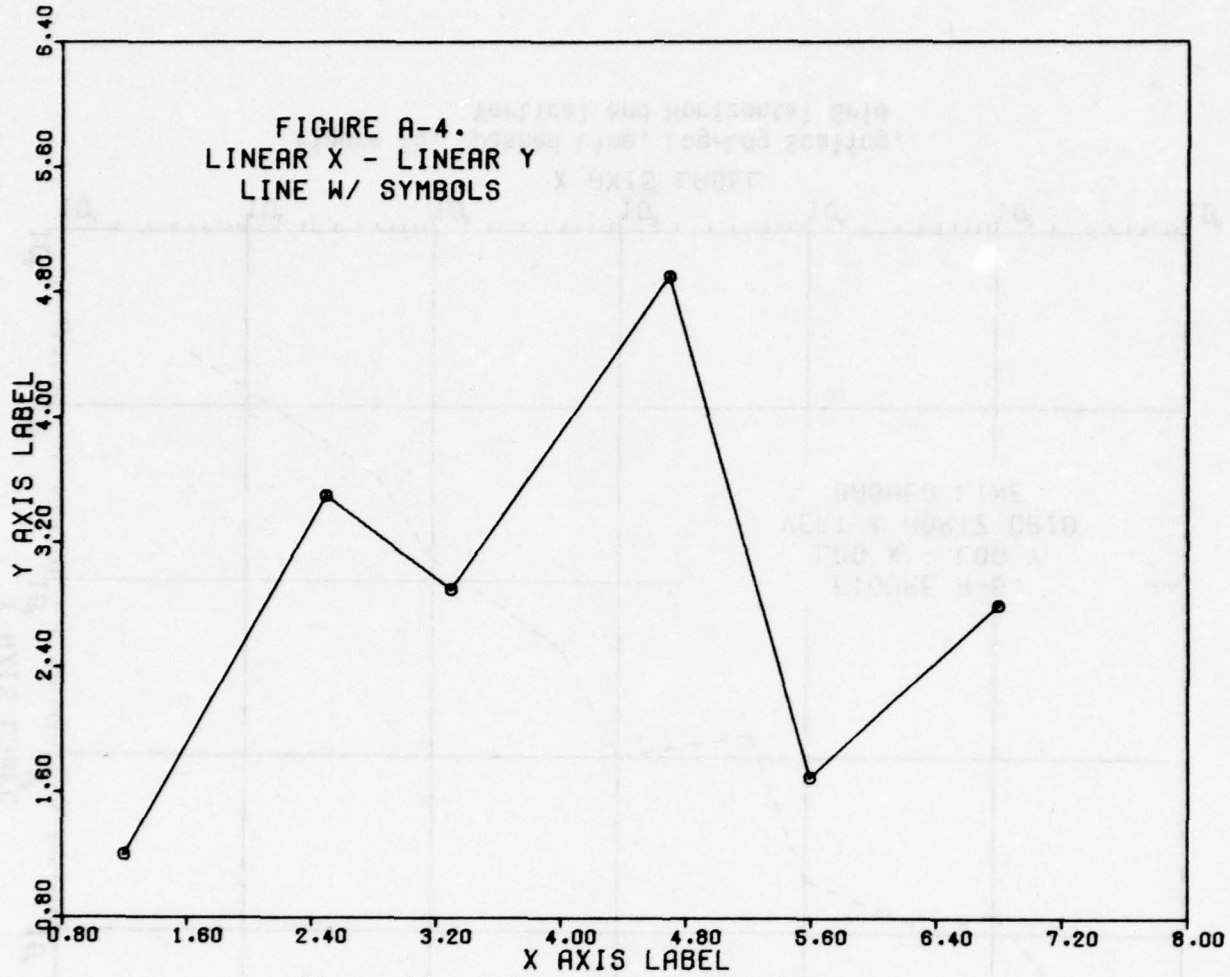


Figure A4. Points Connected by Straight Line, Linear X and Y Scaling

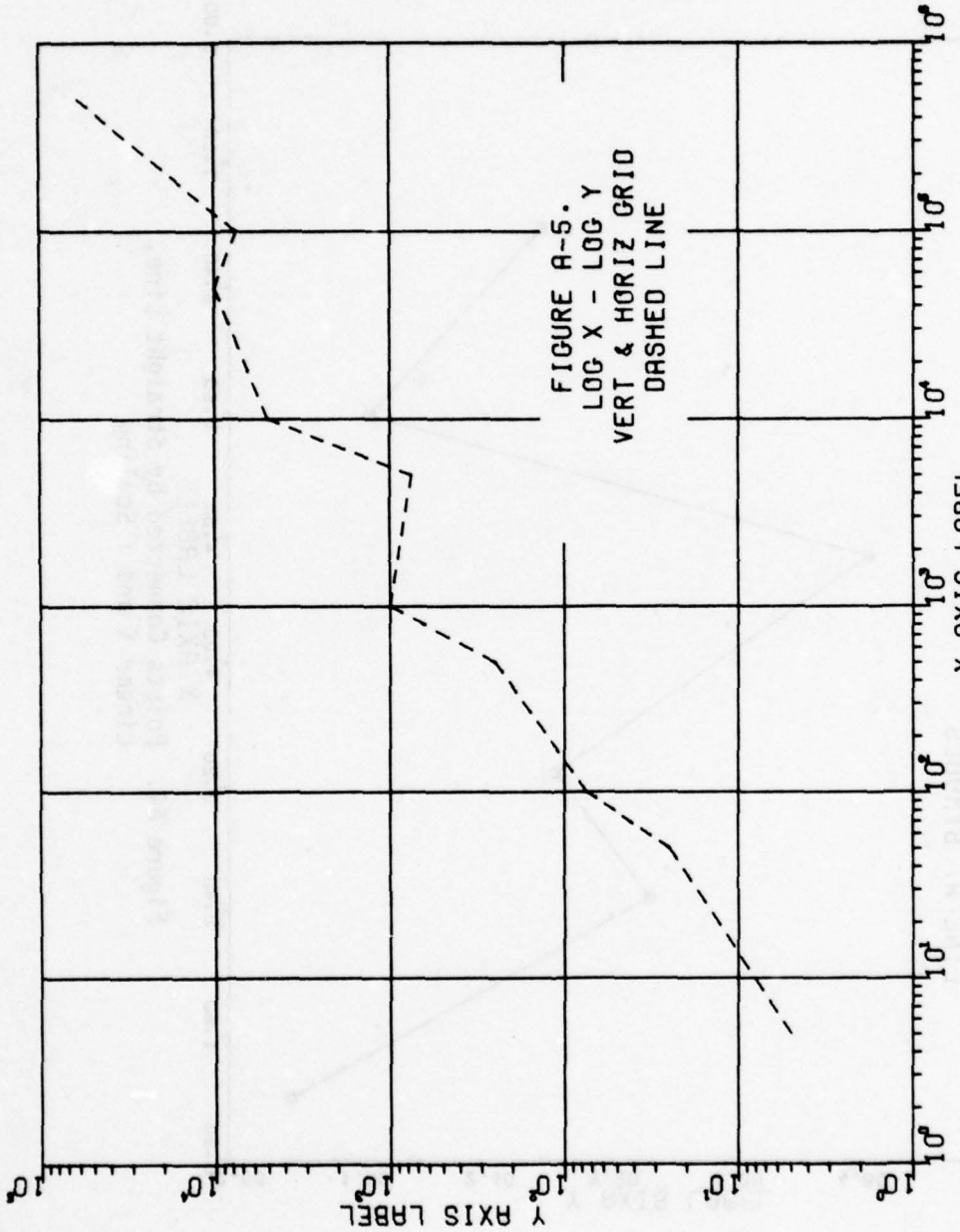
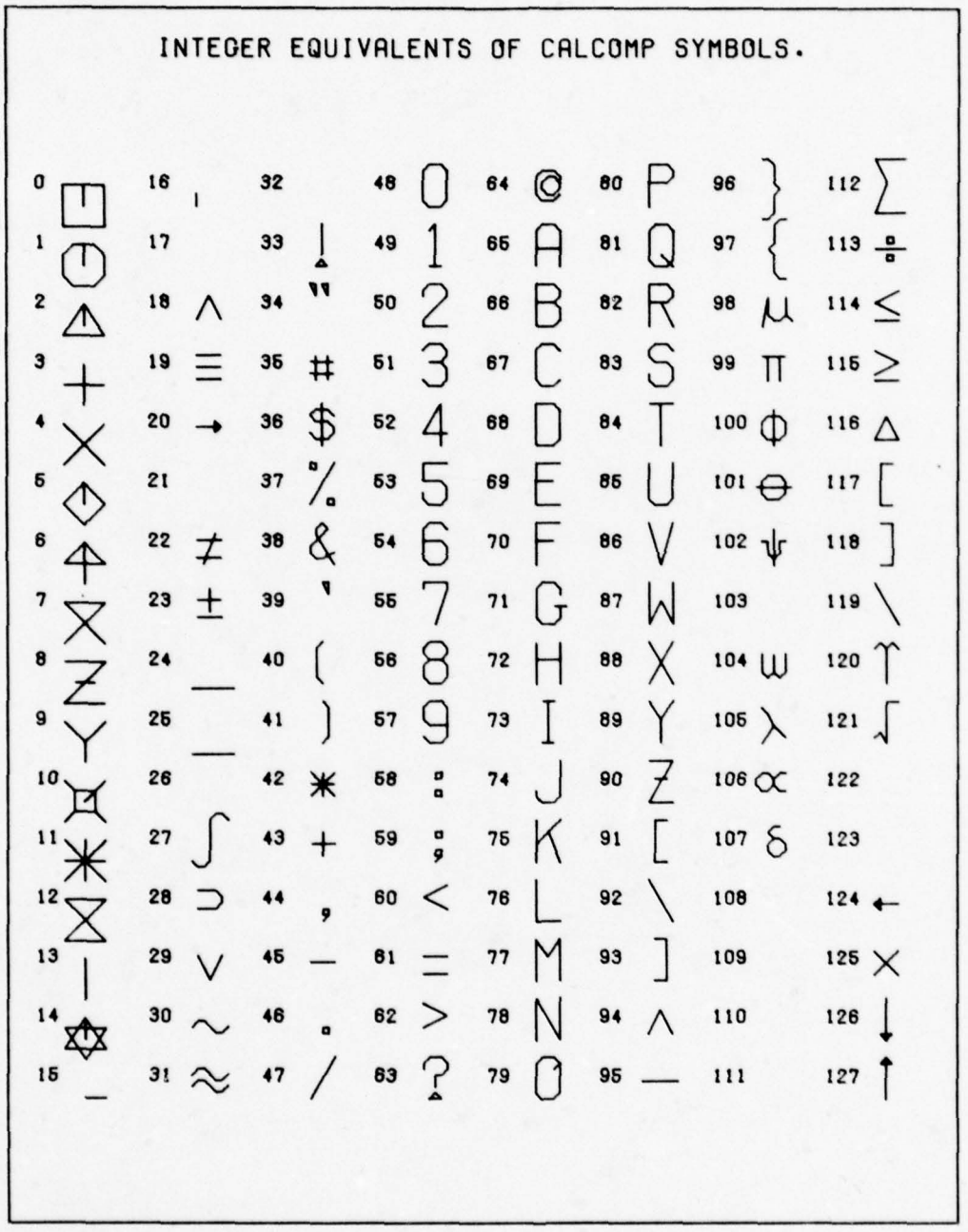


Figure A5. Dashed Line, Log-Log Scaling, Vertical and Horizontal Grid

Table AI. Integer Equivalents of Cal Comp Symbols



APPENDIX B

Contained in this appendix is a complete FORTRAN symbolic listing of all INTERPOL subroutines.

```
C                I * N * T * E * R * P * O * L
C
C   A GENERAL PURPOSE 2-DIMENSIONAL/3-DIMENSIONAL PLOTTING ROUTINE
C
C
C
C
C   THIS IS THE UNIVAC 1108 VERSION.
C
C   MAIN ROUTINE FOR 'INTERPOL':
C
C     THE ARRAYS FOR THE (X,Y) DATA ARE ARBITRARILY SET TO 900
C     IN COMMON DATA. THE NUMBER OF SETS OF DATA PER GRAPH
C     IS ARBITRARILY SET TO 20 VIA COMMON DRAW.
C     THE DIMENSION STATEMENT (ICHK) , BELOW , WAS ARBITRARILY SET
C     TO 100 -- I.E., AN ARBITRARY NUMBER OF GRAPHS PER RUN.
C     IT IS SIMPLY USED TO CHECK VERTICAL AXIS LENGTHS FOR PAPER
C     SIZE RESTRICTIONS.
C
C...  THE NEXT CARD IS FOR CDC MACHINES.
C
C     PROGRAM MAIN(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE29)
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA NOU,NIN/6,5/
      DATA IHN,IHY,IHB,IHO/1HN,1HY,1H ,1HO/
C
      DIMENSION ICHK(100)
      WRITE (NOU,5000)
      SKIP=0.
      NPASS=1
  100 CALL READR (NPASS,MASK)
      CALL AXES (MASK)
      IF (MASK.EQ.IHY) GO TO 105
      IF (IGRID.EQ.IHY) CALL NUGRID
      IF (ITITLE.EQ.IHY) CALL TITLE
      CALL PLOTR
      GO TO 110
  105 CALL HIDE (YSTEP)
      YAXIS=YAXIS+YSTEP
  110 ICHK(NPASS)=YAXIS*FACT
```

```
     118H WRITTEN ON UNIT                                    ,I2,2H      .)
 5040 FORMAT (/39H*** PLOT(S) WILL FIT ON          NARROW       PAPER.)
 5050 FORMAT (/43H*** PLOT(S) WILL NOT FIT ON      NARROW
     PAPER,,/,4X,
     116HUSE         WIDE                          SIZE.)
 5060 FORMAT (/20H*** END OF RUN...../)
C
      END
      SUBROUTINE AXES (MASK)
C
C  THIS SUBROUTINE SCALES ALL DATA AND DRAWS THE APPROPRIATE AXES
C  WITH LABELS AS WELL AS THE GRAPH'S BORDER.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      ITOT=0
         DO 100 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 100     CONTINUE
      GO TO (105,110,115,120), ITYPE
C
C...  ITYPE=1  ----     LINEAR X,LINEAR Y SCALED AXES.
C
 105  CALL SCALE (XARRAY,XAXIS,ITOT,1)
      CALL SCALE (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL AXIS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL AXIS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=2  ----     LINEAR X,LOG Y SCALED AXES.
C
 110  CALL SCALE (XARRAY,XAXIS,ITOT,1)
      CALL SCALG (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL AXIS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
```

```
     1XARRAY(ITOT+2))
      CALL LGAXS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=3  ----     LOG X,LINEAR Y SCALED AXES.
C
 115  CALL SCALG (XARRAY,XAXIS,ITOT,1)
      CALL SCALE (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL LGAXS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL AXIS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=4  ----     LOG X,LOG Y SCALED AXES.
C
 120  CALL SCALG (XARRAY,XAXIS,ITOT,1)
      CALL SCALG (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL LGAXS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL LGAXS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
 125  RETURN
      END
      SUBROUTINE FACTR
C
C  THIS SUBROUTINE CHANGES THE LENGTH OF ALL PEN MOVEMENTS BY A
C  USER SUPPLIED SCALING FACTOR (SUBR. READR). 1.0 IS FULL SCALE.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),
     1ITITL3(5),ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,
     2IGRID,YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
```

```
      CALL FACTOR (FACT)
      RETURN
      END
      SUBROUTINE FIXUP
C
C THIS ROUTINE SETS ANY DATA WHICH IS TO BE LOGARITHMICALLY SCALED
C AND WAS FOUND TO BE EQUAL TO ZERO TO THE MINIMUM OF THE RESPECTIVE
C X OR Y ARRAY. THIS PREVENTS AN ABORTED RUN. THE USER IS TOLD.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
         DO 1 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 1       CONTINUE
      XMIN=1.0E+29
      YMIN=1.0E+29
         DO 2 I=1,ITOT
         XMIN=AMIN1(XMIN,XARRAY(I))
         YMIN=AMIN1(YMIN,YARRAY(I))
 2       CONTINUE
      IF (XMIN.EQ.0.) XMIN=XMIN+.0001
      IF (YMIN.EQ.0.) YMIN=YMIN+.0001
      L=ITYPE-1
      GO TO (3,5,7), L
 3       DO 4 I=1,ITOT
         IF (YARRAY(I).EQ.0.) YARRAY(I)=YMIN
 4       CONTINUE
      GO TO 9
 5       DO 6 I=1,ITOT
         IF (XARRAY(I).EQ.0.) XARRAY(I)=XMIN
 6       CONTINUE
      GO TO 9
 7       DO 8 I=1,ITOT
         IF (XARRAY(I).EQ.0.) XARRAY(I)=XMIN
         IF (YARRAY(I).EQ.0.) YARRAY(I)=YMIN
 8       CONTINUE
 9    CONTINUE
      WRITE (NOU,10)
      RETURN
C
C                          *****FORMAT STATEMENTS*****
C
```

```
 10   FORMAT (/51H*** INPUT WARNING: ZERO'S ENCOUNTERED ON LOGARITHMI,
     119HCALLY SCALED DATA--,/,36H    VALUES WERE RE-SET TO MINIMUM OF,
     233H RESPECTIVE ARRAY (XMIN OR YMIN).)
C
      END
      SUBROUTINE HIDE (YSTEP)
C
C  THIS ROUTINE PLOTS THE 3-DIMENSIONAL GRAPH.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DIMENSION X(900),Y(900),XG(900),G(900),XH(900),H(900)
      EQUIVALENCE (K1,IWHICH), (K2,SLOPE), (FNSM1,Z1), (IGGP1,K1), (K1,
     1N2)
      DATA EPS1,MAXDIM,XSTART,YSTART/1.E-9,900,4.,3./
      F(XX,XI,YI,XIP1,YIP1)=YI+(XX-XI)*(YIP1-YI)/(XIP1-XI)
      WRITE (NOU,5000)
      READ (NIN,5030) IDASH
      YSTEP=YSTART
      SKIP=XAXIS+4.0
      JN=1
      JO=0
      NG=0
      ITOT=0
         DO 100 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 100     CONTINUE
C
         DO 355 JM=1,NSETS
         N1=NPTS(JM)
         JO=JO+N1
         IK=1
            DO 130 IJ=JN,JO
            ITOT=ITOT
            GO TO (120,105,110,115), ITYPE
 105        Y(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/YARRAY(ITOT+
     1       )
             (IK)=XARRAY(IJ)
            GO TO 125
 110        X(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/XARRAY(ITOT+
     1       2)
```

```
            Y(IK)=YARRAY(IJ)
            GO TO 125
115         X(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/XARRAY(ITOT+
     1      2)
            Y(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/YARRAY(ITOT+
     1      2)
            GO TO 125
120         X(IK)=XARRAY(IJ)
            Y(IK)=YARRAY(IJ)
125         IK=IK+1
130         CONTINUE
          JN=JN+N1
            DO 135 I=2,N1
            IF (X(I-1).LT.X(I)) GO TO 135
            WRITE (NOU,5010) X(I-1),X(I)
            RETURN
135         CONTINUE
          IF (JM.GT.1) GO TO 205
          NFNS=NSETS
          XMIN=XARRAY(ITOT+1)
          YMIN=YARRAY(ITOT+1)
          DELTAX=XARRAY(ITOT+2)
          DELTAY=YARRAY(ITOT+2)
          IF (N1+4.LE.MAXDIM) GO TO 140
          GO TO 360
140       SIGN=1.
          IF (NG.LT.-1) SIGN=-1.
          IF (NG.EQ.-1.OR.NG.EQ.-3) GO TO 145
          CALL PLOT (0.,YSTART+YAXIS,3)
          CALL DASHP (XAXIS,YSTART+YAXIS,.03)
          CALL DASHP (XAXIS,YSTART,.03)
          CALL DASHP (0.,YSTART,.03)
          CALL PLOT (XAXIS,YSTART,3)
          CALL DASHP (XAXIS+XSTART,0.,.03)
145       CALL SYMBOL (2.0,YAXIS+YSTART+.10,.14,ITITL1,0.,25)
          GO TO (150,155,160,165), ITYPE
150       CALL AXIS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
          CALL PLOT (XSTART,0.,3)
          CALL PLOT (0.,YSTART,2)
          CALL AXIS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
          GO TO 170
155       CALL AXIS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
          CALL PLOT (XSTART,0.,3)
          CALL PLOT (0.,YSTART,2)
          CALL LGAXS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
          GO TO 170
160       CALL LGAXS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
          CALL PLOT (XSTART,0.,3)
          CALL PLOT (0.,YSTART,2)
          CALL AXIS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
          GO TO 170
```

```
165     CALL LGAXS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
        CALL PLOT 9xstart,0.,3)
        CALL PLOT (0.,YSTART,2)
        CALL LGAXS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
170     INDEXT=3
        GO TO (190,175,180,185), ITYPE
175     YMIN=0.
        DELTAY=1.
        GO TO 190
180     XMIN=0.
        DELTAX=1.
        GO TO 190
185     XMIN=0.
        DELTAX=1.
        YMIN=0.
        DELTAY=1.
190     CONTINUE
        IF (NFNS.LE.0) GO TO 195
        FNSM1=NFNS-1
        DXIN=XSTART*DELTAX/FNSM1
        DYIN=YSTART*DELTAY/FNSM1
195        DO 200 J=1,N1
           XG(INDEXT)=X(J)
           G(INDEXT)=SIGN*Y(J)
           INDEXT=INDEXT+1
200        CONTINUE
        EPS=EPS1*(ABS(XMIN)+ABS(DELTAX))
        NG=N1+4
        XG(1)=-FNSM1*DXIN+XMIN-ABS(XMIN)-ABS(XG(3))-1.
        XG(2)=XG(3)-EPS
        XG(N1+3)=XG(N1+2)+EPS
        ZZ=YMIN
        IF (SIGN.LT.0.) ZZ=-YMIN-50.*DELTAY
        G(1)=ZZ
        G(2)=ZZ
        G(N1+3)=ZZ
        G(NG)=ZZ
        CALL PLOT (XSTART,0.,-3)
        X(N1+1)=XMIN
        X(N1+2)=DELTAX
        Y(N1+1)=YMIN
        Y(N1+2)=DELTAY
        CALL LINE (X,Y,N1,1,0,0)
        DXKK=0.
        DYKK=0.
        RELINC=DELTAX/DELTAY
        XG(NG)=SIGN
        GO TO 355
205     SIGN=XG(NG)
```

```
      XG(NG)=X(N1)
      IF (NFNS) 225,215,210
210   DXKK=DXKK+DXIN
      DYKK=DYKK+DYIN
215      DO 220 J=1,N1
         Y(J)=SIGN*(Y(J)+DYKK)
         X(J)=X(J)-DXKK
220      CONTINUE
225   CALL LOOKUP (X(1),XG(1),JJ)
      IF (JJ.GE.MAXDIM) GO TO 360
         DO 230 J=1,JJ
         XH(J)=XG(J)
         H(J)=G(J)
230      CONTINUE
      IG=JJ+1
      XH(IG)=X(1)
      H(IG)=F(X(1),XG(JJ),G(JJ),XG(IG),G(IG))
      INDEXG=JJ
      INDEXT=1
      Z1=X(1)
      F1=H(IG)-Y(1)
      IT=2
      JJ=IG
      IF (H(IG).GE.Y(1)) GO TO 235
      IF (JJ.GE.MAXDIM) GO TO 360
      JJ=IG+1
      H(JJ)=Y(1)
      XH(JJ)=Z1+EPS
235   LAST=0
      X1=Z1
240   IF (XG(IG).LT.X(IT)) GO TO 245
      IWHICH=0
      X2=X(IT)
      F2=F(X2,XG(IG-1),G(IG-1),XG(IG),G(IG))-Y(IT)
      IT=IT+1
      GO TO 250
245   X2=XG(IG)
      IWHICH=1
      F2=G(IG)-F(X2,X(IT-1),Y(IT-1),X(IT),Y(IT))
      IG=IG+1
250   IF (F1*F2.GT.0.) GO TO 260
      DENOM=X2-X1
      IF (DENOM.EQ.0.) DENOM=.00001
      SLOPE=(F2-F1)/DENOM
      IGG=IG-1-IWHICH
      ITT=IT-2+IWHICH
      IF (ABS(SLOPE*RELINC).GT.1.E-6) GO TO 255
      Z2=X2
      GO TO 270
2
```

```
255      Z2=X1-F1/SLOPE
         GO TO 270
260      X1=X2
         F1=F2
         IF (IT.LE.N1) GO TO 240
265      LAST=1
         Z2=X(N1)
         CALL LOOKUP (Z2,XG(INDEXG),IGG)
         IGG=INDEXG+IGG-1
         ITT=N1-1
270      ZZ=.99*Z1+.01*Z2
         CALL LOOKUP (ZZ,X(INDEXT),K1)
         CALL LOOKUP (ZZ,XG(INDEXG),K2)
         K1=K1+INDEXT-1
         K2=K2+INDEXG-1
         IF (F(ZZ,X(K1),Y(K1),X(K1+1),Y(K1+1)).GT.F(ZZ,XG(K2),G(K2),
     1   XG(K2+1),G(K2+1))) GO TO 300
         IF (JJ+IGG-INDEXG.GE.MAXDIM) GO TO 360
         NGR=ITT-INDEXT+2
         NN2=JJ
         NJJ=JJ
         ANUX(NJJ)=XH(NJJ)
         ANUY(NJJ)=H(NJJ)
         IF (NGR.EQ.2) GO TO 280
         NJ1=INDEXT+1
            DO 275 I=NJ1,ITT
            NJJ=NJJ+1
            ANUX(NJJ)=X(I)
             NUY(NJJ)=Y(I)
275         CONTINUE
280      NJJ=NJJ+1
         ANUX(NJJ)=Z2
         ANUY(NJJ)=F(Z2,X(ITT),Y(ITT),X(ITT+1),Y(ITT+1))
          NM=NN2+NGR-1
         NL=0
            DO 285 I=NN2,NNM
            NL=NL+1
            ANUHX(NL)=ANUX(I)
            ANUHY(NL)=ANUY(I)
285         CONTINUE
         ANUHX(NL+1)=XMIN
         ANUHY(NL+1)=YMIN
         ANUHY(NL+2)=DELTAY
         ANUHX(NL+2)=DELTAX
         IF (IDASH.EQ.IHY) CALL DASHL (ANUHX,ANUHY,NL,1)
         IF (INDEXG.EQ.IGG) GO TO 295
         J1=INDEXG+1
            DO 290 I=J1,IGG
            JJ=JJ+1
            XH(JJ)=XG(I)
            H(JJ)=G(I)
290         CONTINUE
```

```
295      JJ=JJ+1
         XH(JJ)=Z2
         H(JJ)=F(Z2,XG(IGG),G(IGG),XG(IGG+1),G(IGG+1))
         INDEXG=IGG
         INDEXT=ITT
         GO TO 320
300      NGRAPH=ITT-INDEXT+2
         IF (JJ+NGRAPH-1.GT.MAXDIM) GO TO 360
         N2=JJ
         IF (NGRAPH.EQ.2) GO TO 310
         J1=INDEXT+1
            DO 305 I=J1,ITT
            JJ=JJ+1
            XH(JJ)=X(I)
            H(JJ)=Y(I)
305         CONTINUE
310      JJ=JJ+1
         XH(JJ)=Z2
         H(JJ)=F(Z2,X(ITT),Y(ITT),X(ITT+1),Y(ITT+1))
         NM=N2+NGRAPH-1
         L=0
            DO 315 I=N2,NM
            L=L+1
            XPTS(L)=XH(I)
            YPTS(L)=H(I)
315         CONTINUE
         XPTS(L+1)=XMIN
         XPTS(L+2)=DELTAX
         YPTS(L+1)=SIGN*YMIN
         YPTS(L+2)=SIGN*DELTAY
         CALL LINE (XPTS,YPTS,L,1,0,0)
         INDEXT=ITT
         INDEXG=IGG
320      IF (LAST.EQ.1) GO TO 325
         X1=X2
         F1=F2
         Z1=Z2
         IF (IT.LE.N1) GO TO 240
         GO TO 265
325      IF (XG(NG).LE.XG(NG-1)) NG=NG-1
         IF (XG(NG).LE.X(N1)) GO TO 335
         IF (JJ+3+NG-IGG.GT.MAXDIM) GO TO 360
         XH(JJ+1)=XH(JJ)+EPS
         JJ=JJ+1
         H(JJ)=F(X(N1),XG(IGG),G(IGG),XG(IGG+1),G(IGG+1))
         IGGP1=IGG+1
            DO 330 J=IGGP1,NG
            JJ=JJ+1
            XH(JJ)=XG(J)
            H(JJ)=G(J)
```

```
330         CONTINUE
 335      NG=JJ+2
          IF (NG.GE.MAXDIM) GO TO 360
             DO 340 I=1,JJ
             G(I)=H(I)
             XG(I)=XH(I)
 340         CONTINUE
          XG(JJ+1)=XG(JJ)+EPS
          G(JJ+1)=YMIN+DYKK
          IF (SIGN.LT.0.) G(JJ+1)=-YMIN-50.*DELTAY+DYKK
          G(NG)=G(JJ+1)
          IF (NFNS.LT.0) GO TO 350
             DO 345 I=1,N1
             X(I)=X(I)+DXKK
             Y(I)=SIGN*Y(I)-DYKK
 345         CONTINUE
 350      XG(NG)=SIGN
 355      CONTINUE
       CALL PLOT (XAXIS,0.0,3)
       CALL PLOT (SKIP,0.0,-3)
       RETURN
 360   WRITE (6,5020) MAXDIM
        ETURN
C
C                              *****FORMAT STATEMENTS*****
C
 5000 FORMAT (/37H    DO YOU WANT ANY                HIDDEN
3-D data,/4X,
     140HPLOTTED WITH A DASHED LINE -- YES OR NO?)
 5010 FORMAT (/33H*** INPUT ERROR (HIDE): X(I-1) = ,1PE10.4,5X,6HX(I) =,
     11X,1PE10.4,/,35H      X(I-1) MUST BE LESS THAN X(I))
 5020 FORMAT (/48H*** ERROR IN DIMENSIONED ARRAYS (HIDE): MAXDIM =,I4,/,
     135H    INCREASE MAXDIM TO RUN PROBLEM.)
 5030 FORMAT (A1)
C
       END
       SUBROUTINE INIT
C
C  THIS SUBROUTINE INITIALIZES THE PLOTTER. THE (X,Y) COORDINATES
C  IN THE DATA STATEMENT SET THE POSITION OF THE GRAPH'S ORIGIN
C  ON THE PAPER (I.E., LOWER LEFT HAND CORNER).
C
       COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
      1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
      2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
       COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
      1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
```

```
common /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA X,Y/3.0,2.0/
C
      CALL PLOTS (IBUFF,NLOC,LDEV)
      CALL PLOT (0.0,-36.0,-3)
      CALL PLOT (X,Y,-3)
      RETURN
      END
      SUBROUTINE LOOKUP (X,XTBL,J)
C
C  THIS SUBROUTINE IS CALLED FROM HIDE AS AN EFFICIENT METHOD
C  OF TABLE LOOKUP (STOLEN FROM TRACOR 3-D PLOT PACKAGE).
C
      DIMENSION XTBL(1)
      J=2
 1    IF (XTBL(J)-X) 2,3,4
 2    J=J+1
      GO TO 1
 3    RETURN
 4    J=J-1
      RETURN
      END
      SUBROUTINE NUGRID
C
C  THIS SUBROUTINE DRAWS GRID LINES AS REQUESTED BY THE USER. IT
C  WILL NOT DRAW THROUGH THE TITLE. ZINC IS THE INCREMENT BY WHICH
C  THE PLOT PEN CHECKS TO SEE IF IT IS WITHIN THE TITLE BOUNDARIES
C  SET UP BY SUBROUTINE TITLE.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA ZINC/0.1/
C
      IF (ILINES.EQ.0) GO TO 125
      GO TO (100,105,110,115,120), ILINES
 100  Y1=Y2-.3
      GO TO 125
 105  Y1=Y2-.6
      GO TO 125
```

```
110   Y1=Y2-.9
      GO TO 125
 115  Y1=Y2-1.2
      GO TO 125
 120  Y1=Y2-1.5
 125  CONTINUE
      X2=X1+3.75
C
C...  DRAWS VERTICAL GRID LINES.
C
      ITOT=0
         DO 130 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 130     CONTINUE
      IF (XINC.EQ.0.0) GO TO 160
      IF (ITYPE.EQ.1.OR.ITYPE.EQ.2) XINC=1.
      IF (ITYPE.EQ.3.OR.ITYPE.EQ.4) XINC=1./XARRAY(ITOT+2)
      X=XINC
      ICOUNT=XAXIS/XINC
      JCOUNT=YAXIS/ZINC
         DO 155 I=1,ICOUNT
         Y=0.0
         CALL PLOT (X,Y,3)
            DO 150 J=1,JCOUNT
            Y=Y+ZINC
            IF (X.GE.X1.AND.X.LE.X2) GO TO 135
            GO TO 140
 135        IF (Y.GE.Y1.AND.Y.LE.Y2) GO TO 145
 140        CALL PLOT (X,Y,2)
            GO TO 150
 145        CALL PLOT (X,Y,3)
 150        CONTINUE
         X=X+XINC
 155     CONTINUE
C
C...  DRAWS HORIZONTAL GRID LINES.
C
      IF (YINC.EQ.0.0) GO TO 190
 160  IF (ITYPE.EQ.1.OR.ITYPE.EQ.3) YINC=1.
      IF (ITYPE.EQ.2.OR.ITYPE.EQ.4) YINC=1./YARRAY(ITOT+2)
      Y=YINC
      KCOUNT=YAXIS/YINC
      LCOUNT=XAXIS/ZINC
         DO 185 K=1,KCOUNT
         X=0.0
         CALL PLOT (X,Y,3)
            DO 180 L=1,LCOUNT
            X=X+ZINC
            IF(Y.GE.Y1.AND.Y.LE.Y2) GO TO 165
```

```
            GO TO 170
  165       IF (X.GE.X1.AND.X.LE.X2) GO TO 175
  170       CALL PLOT (X,Y,2)
            GO TO 180
  175       CALL PLOT (X,Y,3)
  180       CONTINUE
          Y=Y+YINC
  185     CONTINUE
  190   RETURN
        END
        SUBROUTINE PLOTR
C
C  THIS SUBROUTINE SETS UP THE DATA ARRAYS WITH APPROPRIATE SCALING
C  FACTORS (COMPUTED IN SUBR. AXES),GENERATES HISTOGRAMS IF REQUESTED
C  AND THEN PLOTS ALL DATA AS INPUT IN SUBROUTINE READR.
C
C  THIS ROUTINE IS ALSO NEXT TO IMPOSSIBLE TO EXPLAIN OR FOLLOW
C
        COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
       1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
       2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
        COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
       1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
        COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
       1LOGTYP(20),SKIP
C
        SKIP=XAXIS+4.0
        JN=1
        JO=0
        ITOT=0
           DO 100 I=1,NSETS
           ITOT=ITOT+NPTS(I)
  100      CONTINUE
C
           DO 255 JM=1,NSETS
           L=IPLOT(JM)
           JO=JO+NPTS(JM)
           IK=1
              DO 130 IJ=JN,JO
              XPTS(IK)=XARRAY(IJ)
              YPTS(IK)=YARRAY(IJ)
              IF (IPLOT(JM).GE.5) GO TO 105
              ITOT=ITOT
              GO TO 125
  105         IF (LOGTYP(JM)) 120,115,110
  110         ANUX(IK)=XARRAY(IJ)
              ANUY(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/
       1YARRAY(ITOT+2)
```

```
            GO TO 125
  115       ANUX(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/
     1      XARRAY(ITOT+2)
            ANUY(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/
     1      YARRAY(ITOT+2)
            GO TO 125
  120       ANUX(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/
     1      XARRAY(ITOT+2)
            ANUY(IK)=YARRAY(IJ)
            GO TO 125
  125       IK=IK+1
  130       CONTINUE
          XPTS(IK)=XARRAY(ITOT+1)
          XPTS(IK+1)=XARRAY(ITOT+2)
          YPTS(IK)=YARRAY(ITOT+1)
          YPTS(IK+1)=YARRAY(ITOT+2)
          IF (IPLOT(JM).GE.5) GO TO 135
          GO TO 155
  135     IF (LOGTYP(JM)) 150,145,140
  140     ANUX(IK)=XARRAY(ITOT+1)
          ANUX(IK+1)=XARRAY(ITOT+2)
          ANUY(IK)=0.0
          ANUY(IK+1)=1.0
          GO TO 155
  145     ANUX(IK)=0.
          ANUX(IK+1)=1.
          ANUY(IK)=0.
          ANUY(IK+1)=1.
          GO TO 155
  150     ANUX(IK)=0.
          ANUX(IK+1)=1.
          ANUY(IK)=YARRAY(ITOT+1)
          ANUY(IK+1)=YARRAY(ITOT+2)
          GO TO 155
  155     JN=JN+NPTS(JM)
C
C...  SECTION TO GENERATE/PLOT NEW ARRAYS
```

```
C
      IF (IPLOT(JM).EQ.3.OR.IPLOT(JM).EQ.6.OR.IHIST(JM).EQ.IHN)
     1  GO TO 220
      IF (IPLOT(JM).EQ.5) GO TO 160
      GO TO 185
160   JZ=3
      ANUHX(1)=ANUX(1)
      ANUHY(1)=ANUY(1)
      ANUHX(2)=ANUX(2)
      ANUHY(2)=ANUY(2)
      KZ=NPTS(JM)-1
         DO 165 IZ=2,KZ
         ANUHX(JZ)=ANUX(IZ)
         ANUHY(JZ)=ANUY(IZ+1)
         JZ=JZ+1
         ANUHX(JZ)=ANUX(IZ+1)
         ANUHY(JZ)=ANUY(IZ+1)
         JZ=JZ+1
165      CONTINUE
      IF (LOGTYP(JM)) 180,175,170
170   ANUHX(JZ)=XARRAY(ITOT+1)
      ANUHX(JZ+1)=XARRAY(ITOT+2)
      ANUHY(JZ)=0.0
      ANUHY(JZ+1)=1.0
      GO TO 195
175   ANUHX(JZ)=0.0
      ANUHX(JZ+1)=1.0
      ANUHY(JZ)=0.0
      ANUHY(JZ+1)=1.0
      GO TO 195
180   ANUHX(JZ)=0.0
      ANUHX(JZ+1)=1.0
      ANUHY(JZ)=YARRAY(ITOT+1)
      ANUHY(JZ+1)=YARRAY(ITOT+2)
      GO TO 195
185   J=3
      HISTOX(1)=XPTS(1)
      HISTOY(1)=YPTS(1)
      HISTOX(2)=XPTS(2)
      HISTOY(2)=YPTS(2)
      KK=NPTS(JM)-1
         DO 190 I=2,KK
         HISTOX(J)=XPTS(I)
         HISTOY(J)=YPTS(I+1)
         J=J+1
         HISTOX(J)=XPTS(I+1)
         HISTOY(J)=YPTS(I+1)
         J=J+1
190      CONTINUE
```

```
          HISTOX(J)=XARRAY(ITOT+1)
          HISTOX(J+1)=XARRAY(ITOT+2)
          HISTOY(J)=YARRAY(ITOT+1)
          HISTOY(J+1)=YARRAY(ITOT+2)
  195     NPT=(NPTS(JM)*2)-2
          GO TO (200,205,255,210,215,255), L
  200     CALL LINE (HISTOX,HISTOY,NPT,1,LINTYP(JM),INTEQ(JM))
          GO TO 255
  205     CALL DASHL (HISTOX,HISTOY,NPT,1)
          GO TO 255
  210     CALL LGLIN (HISTOX,HISTOY,NPT,1,LINTYP(JM),INTEQ(JM),LOGTYP(JM)
        1 )
          GO TO 255
  215     CALL DASHL (ANUHX,ANUHY,NPT,1)
          GO TO 255
C
C...  SECTION FOR PLOTTING REGULAR DATA (NO HISTOGRAMS).
C
C     IPLOT=1 ----  STRAIGHT LINE:LINEAR AXES
C     IPLOT=2 ----  DASH LINE:LINEAR AXES ONLY
C     IPLOT=3 ----  SMOOTH LINE:LINEAR AXES
C     IPLOT=4 ----  STRAIGHT LINE:LOG-LOG,SEMI-LOG AXES
C     IPLOT=5 ----  DASH LINE:LOG-LOG,SEMI-LOG AXES
C     IPLOT=6 ----  SMOOTH LINE:LOG-LOG,SEMI-LOG AXES
C
  220     GO TO (225,230,235,240,245,250), L
  225     CALL LINE (XPTS,YPTS,NPTS(JM),1,LINTYP(JM),INTEQ(JM))
          GO TO 255
  230     CALL DASHL (XPTS,YPTS,NPTS(JM),1)
          GO TO 255
  235     CALL FLINE (XPTS,YPTS,-NPTS(JM),1,LINTYP(JM),INTEQ(JM))
          GO TO 255
  240     CALL LGLIN (XPTS,YPTS,NPTS(JM),1,LINTYP(JM),INTEQ(JM),
        1   LOGTYP(JM))
          GO TO 255
  245     CALL DASHL (ANUX,ANUY,NPTS(JM),1)
          GO TO 255
  250     CALL FLINE (ANUX,ANUY,-NPTS(JM),1,LINTYP(JM),INTEQ(JM))
  255     CONTINUE
      CALL PLOT (XAXIS,0.0,3)
      CALL PLOT (SKIP,0.0,-3)
      RETURN
      END
      SUBROUTINE READR (NPASS,MASK)
C
C  THIS SUBROUTINE HANDLES THE INTERACTIVE I/O - - READS IN PLOT
C  INSTRUCTIONS AS WELL AS THE DATA.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
```

```
2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
C...  THE FOLLOWING 3 CARDS ARE FOR UNIVAC MACHINES.
C
      DIMENSION IA(2)
      IA(1)=6H@ASG,T
      IA(2)=6H 29.
C
      IF ((NPASS).GT.1) GO TO 125
  100 WRITE (NOU,5060)
      READ (NIN,5030,ERR=105) LDEV
      GO TO 110
  105 WRITE (NOU,5020)
      GO TO 100
C
C...  THE FOLLOWING 4 CARDS ARE FOR UNIVAC MACHINES.
C
  110 IF (LDEV.EQ.0) GO TO 115
      GO TO 120
  115 CALL ERTRAN (6,IA)
      LDEV=29
C
C...  THE FOLLOWING CARD WOULD BE USED FOR CDC MACHINES.
C
C110  IF (LDEV.EQ.0) LDEV=29
C
  120 CALL INIT
  125 WRITE (NOU,5070) NPASS
      WRITE (NOU,5080)
      READ (NIN,5050) MASK
  130 WRITE (NOU,5090)
      READ (NIN,5030,ERR=135) XAXIS
      GO TO 140
  135 WRITE (NOU,5020)
      GO TO 130
  140 IF (XAXIS.EQ.0) XAXIS=9
  145 WRITE (NOU,5100)
      READ (NIN,5030,ERR=150) YAXIS
      GO TO 155
  150 WRITE (NOU,5020)
      GO TO 145
  155 IF (YAXIS.EQ.0) YAXIS=7
  160 WRITE (NOU,5110)
```

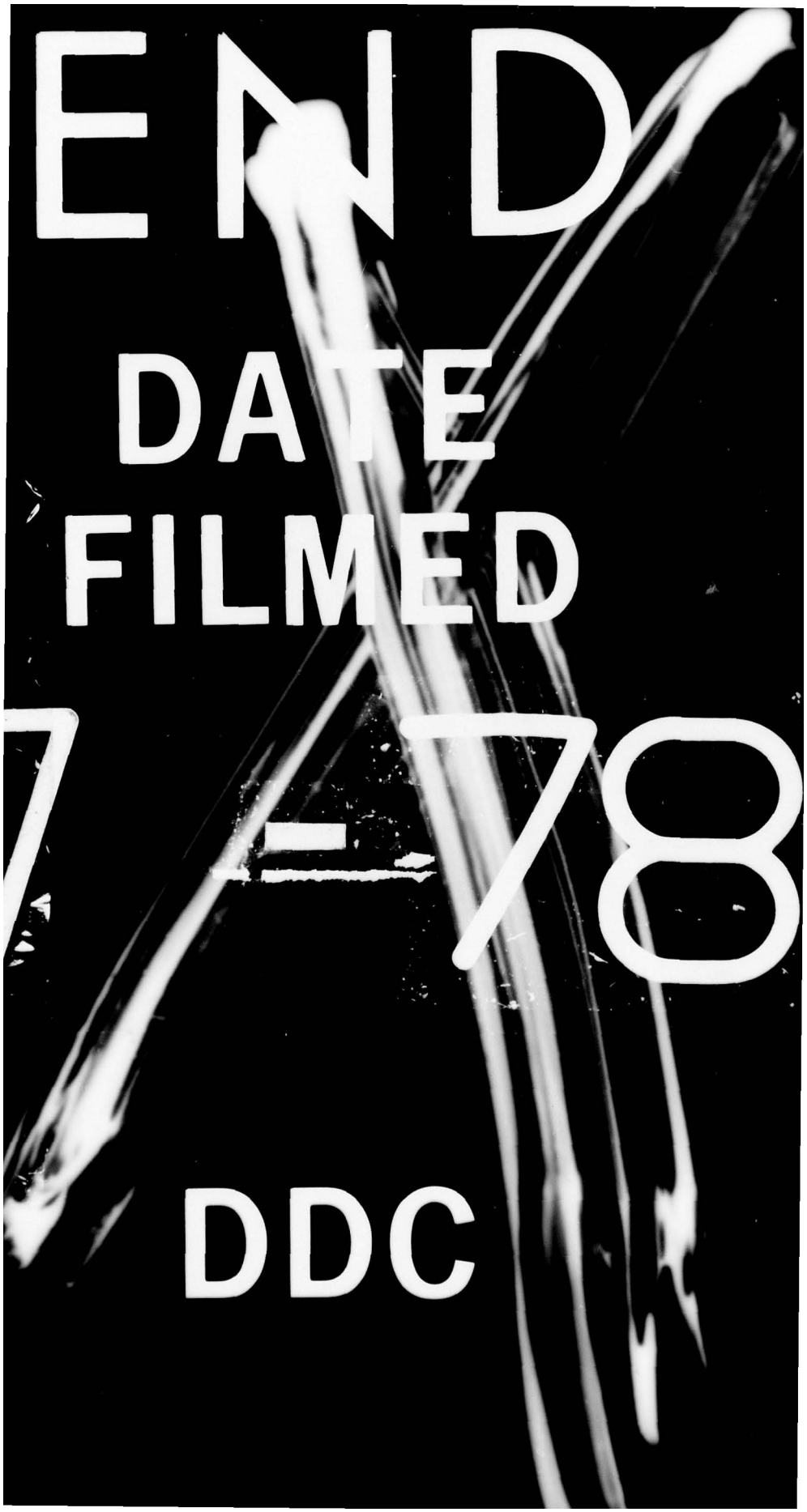
```
      READ(NIN,5030,ERR=165) FACT
      IF (FACT.EQ.0.) FACT=1.
      IF (FACT.GT.0.) GO TO 170
      WRITE (NOU,5120)
      GO TO 160
165   WRITE (NOU,5020)
      GO TO 160
170   CALL FACTR
      IF (MASK.NE.IHY) GO TO 175
      WRITE (NOU,5010)
      READ (NIN,5040) ITITL1
      GO TO 235
175   WRITE (NOU,5130)
      READ (NIN,5050) ITITLE
      IF (ITITLE.EQ.IHN.OR.ITITLE.EQ.IHB.OR.ITITLE.EQ.IH0) GO TO 235
180   WRITE (NOU,5140)
      READ (NIN,5030,ERR=185) X1,Y2
      GO TO 190
185   WRITE (NOU,5020)
      GO TO 180
190   WRITE (NOU,5150)
      READ (NIN,5030,ERR=195) ILINES
      GO TO 200
195   WRITE (NOU,5020)
      GO TO 190
200   WRITE (NOU,5160) ILINES
         DO 230 I=1,ILINES
         GO TO (205,210,215,220,225), I
205      READ (NIN,5040) ITITL1
         GO TO 230
210      READ (NIN,5040) ITITL2
         GO TO 230
215      READ (NIN,5040) ITITL3
         GO TO 230
220      READ (NIN,5040) ITITL4
         GO TO 230
225      READ (NIN,5040) ITITL5
230      CONTINUE
235   WRITE (NOU,5170)
      READ (NIN,5040) IXAXIS
      WRITE (NOU,5180)
      READ (NIN,5040) IYAXIS
      IF (MASK.EQ.IHY) GO TO 255
      WRITE (NOU,5190)
      READ (NIN,5050) IGRID
      IF (IGRID.EQ.IHN.OR.IGRID.EQ.IHB.OR.IGRID.EQ.IH0) GO TO 255
240   WRITE (NOU,5200)
      READ (NIN,5030,ERR=245) LGRID
      GO TO 250
```

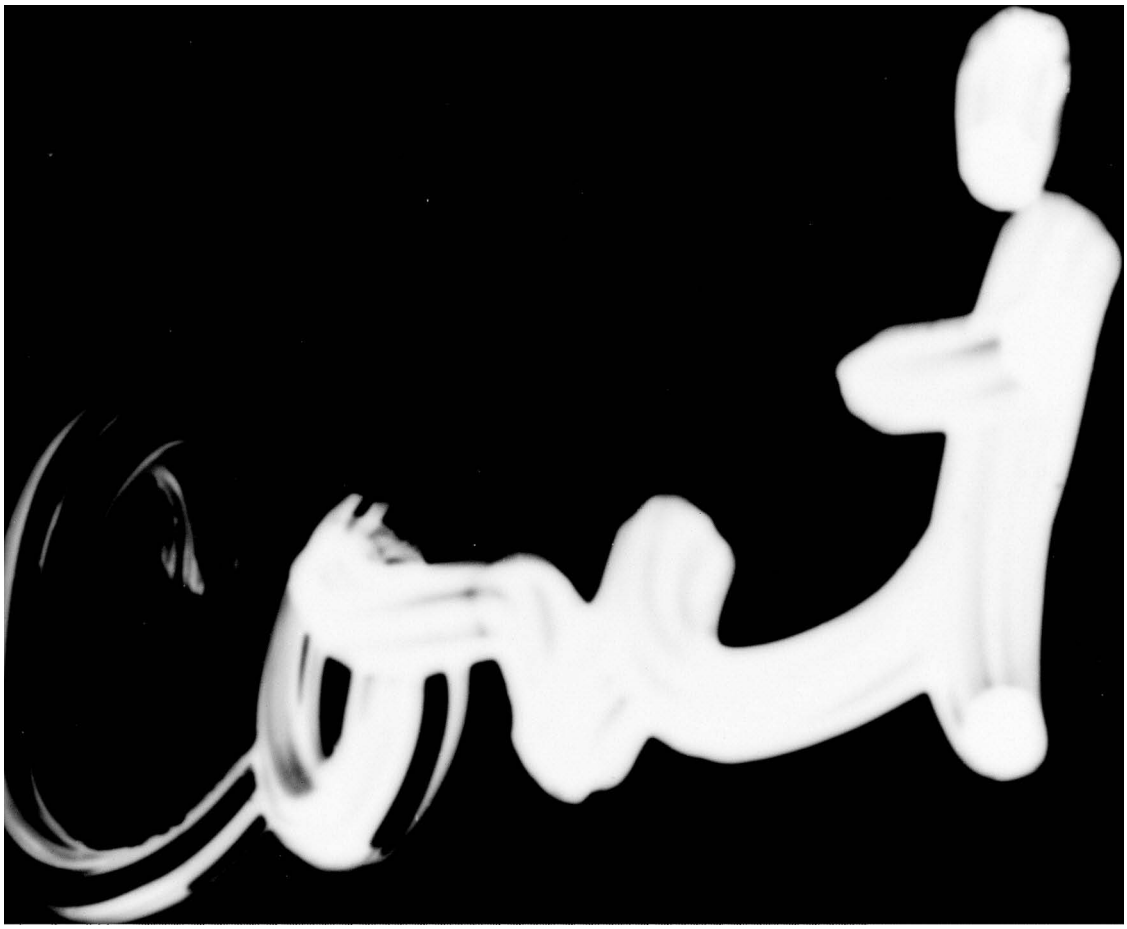
```
245  WRITE (NOU,5020)
     GO TO 240
250  XINC=10.
     YINC=10.
     IF (LGRID.LT.0) XINC=0.
     IF (LGRID.GT.0) YINC=0.
255  WRITE (NOU,5210)
     READ (NIN,5030,ERR=260) ITYPE
     GO TO 265
260  WRITE (NOU,5020)
     GO TO 255
265  WRITE (NOU,5220) NPASS
     READ (NIN,5030,ERR=270) NSETS
     GO TO 275
270  WRITE (NOU,5020)
     GO TO 265
275  II=0
        DO 375 K=1,NSETS
        IF (MASK.EQ.IHY.AND.K.EQ.1) WRITE (NOU,5000)
        IF (MASK.EQ.IHY) GO TO 360
280     WRITE (NOU,5230) K
        READ (NIN,5030,ERR=285) LINTYP(K)
        GO TO 290
285     WRITE (NOU,5020)
        GO TO 280
290     IF (LINTYP(K).GE.0) GO TO 295
        IF (ITYPE.EQ.1) IPLOT(K)=1
        IF (ITYPE.GT.1) IPLOT(K)=4
        IF (ITYPE.EQ.2) LOGTYP(K)=1
        IF (ITYPE.EQ.3) LOGTYP(K)=-1
        IF (ITYPE.EQ.4) LOGTYP(K)=0
        GO TO 330
295     IF (LINTYP(K).GT.0) GO TO 315
300     WRITE (NOU,5240) K
        READ (NIN,5030,ERR=305) IPLOT(K)
        GO TO 310
305     WRITE (NOU,5020)
        GO TO 300
310     IF (ITYPE.GT.1) IPLOT(K)=IPLOT(K)+3
        IF (ITYPE.EQ.2) LOGTYP(K)=1
        IF (ITYPE.EQ.3) LOGTYP(K)=-1
        IF (ITYPE.EQ.4) LOGTYP(K)=0
        GO TO 340
315     WRITE (NOU,5250) K
        READ (NIN,5030,ERR=320) IPLOT(K)
        GO TO 325
320     WRITE (NOU,5020)
        GO TO 315
```

```
325      IF (IPLOT(K).EQ.2) IPLOT(K)=3
         IF (ITYPE.GT.1) IPLOT(K)=IPLOT(K)+3
         IF (ITYPE.EQ.2) LOGTYP(K)=1
         IF (ITYPE.EQ.3) LOGTYP(K)=-1
         IF (ITYPE.EQ.4) LOGTYP(K)=0
 330     WRITE (NOU,5260)
         READ (NIN,5030,ERR=335) INTEQ(K)
         GO TO 340
 335     WRITE (NOU,5020)
         GO TO 330
 340     IF (IPLOT(K).EQ.3.OR.IPLOT(K).EQ.6) GO TO 360
 345     WRITE (NOU,5270) K
         READ (NIN,5050,ERR=350) IHIST(K)
         GO TO 355
 350     WRITE (NOU,5020)
         GO TO 345
 355     IF (IHIST(K).EQ.IHY) WRITE (NOU,5280)
 360     WRITE (NOU,5290) K
         KFIX=0
C
C...  THE FOLLOWING LOOP READS THE (X,Y) DATA.
C
            DO 365 I=1,100000
            II=II+1
C
C...  UNIVAC FORMATTED READ.
C
            READ (NIN,5030,END=370) XARRAY(II),YARRAY(II)
C
C...  CDC READ WITH 2-BRANCH EOF CHECK.
C
C           READ(NIN,5030)XARRAY(II),YARRAY(II)
C           IF(EOF(NIN))370,100
C100        IF(ITYPE.EQ.3.AND.XARRAY(II).EQ.0.)KFIX=1
C
            IF (ITYPE.EQ.3.AND.XARRAY(II).EQ.0.) KFIX=1
            IF (ITYPE.EQ.2.AND.YARRAY(II).EQ.0.) KFIX=1
            IF (ITYPE.EQ.4.AND.XARRAY(II).EQ.0.OR.ITYPE.EQ.4.AND.YARRAY(
     1II).EQ.0.) KFIX=1
 365        CONTINUE
 370     I=I-1
         II=II-1
         NPTS(K)=I
 375     CONTINUE
      IF (KFIX.EQ.1) CALL FIXUP
      RETURN
C
C                          *****FORMAT STATEMENTS*****
C
 5000 FORMAT (/51H*** NOTE: FOR A 3-D PLOT ONLY A SOLID-STRAIGHT LINE,/,
```

```
141H          IS AVAILABLE FOR ALL DATA SETS.)
 5010 FORMAT (/43H    PLOT TITLE ( ONE LINE, 25 CHARACTERS )?,/,
     125H ------- 25 CHAR ------- )
 5020 FORMAT (/36H*** INPUT ERROR: RE-ENTER LAST LINE.)
 5030 FORMAT ()
 5040 FORMAT (5A6)
 5050 FORMAT (A1)
 5060 FORMAT (/38H    LOGICAL UNIT NUMBER FOR PLOT TAPE?,/,
     124H    DEFAULT = UNIT                          29          .)
 5070 FORMAT (/38H*** THE FOLLOWING PERTAIN TO GRAPH NO.,I2,/)
 5080 FORMAT (49H    DO YOU WANT A 3-DIMENSIONAL PLOT -- YES OR NO,
     117H (DEFAULT = 2-D)?)
 5090 FORMAT (/43H    X AXIS LENGTH (INCHES) -- DEFAULT = 9       .)
 5100 FORMAT (/43H    Y AXIS LENGTH (INCHES) -- DEFAULT = 7       .)
 5110 FORMAT (/39H    PLOT SIZE SCALING FACTOR -- DEFAULT,14H = FULL SCA
     1LE.)
 5120 FORMAT (/43H*** INPUT ERROR: SCALING FACTOR MUST BE NON,
     110H-NEGATIVE,,/,23H    RE-ENTER LAST LINE.)
 5130 FORMAT (/51H    DO YOU WANT A TITLE BLOCK -- YES OR NO (DEFAULT,
     113H = NO TITLE)?)
 5140 FORMAT (/51H    GIVE  X,Y  COORDINATE (INCHES) FOR PLACEMENT OF,/,
     14X,37HTHE UPPER LEFT CORNER OF TITLE BLOCK.)
 5150 FORMAT (/43H    YOU NOW HAVE ROOM FOR 5 LINES OF PRINT,,
     124H 25 CHARACTERS PER LINE.,/,4X,27HHOW MANY LINES DO YOU NEED?)
 5160 FORMAT (/24H    ENTER SCRIPT FOR THE,I2,9H LINE(S):,/,
     125H ------- 25 CHAR ------- )
 5170 FORMAT (/38H    X AXIS LABEL (25 CHARACTER LIMIT)?,/,
     125H ------- 25 CHAR ------- )
 5180 FORMAT (/38H    Y AXIS LABEL (25 CHARACTER LIMIT)?,/,
     125H ------- 25 CHAR ------- )
 5190 FORMAT (/44H    DO YOU WANT A GRID -- YES OR NO (DEFAULT,
     112H = NO GRID)?)
 5200 FORMAT (/46H    SELECT ONE OF THE FOLLOWING FOR YOUR GRID:,/,4X,
     132H  -1= HORIZONTAL GRID LINES ONLY,/,4X,40H   0= HORIZONTAL AND V
     2ERTICAL GRID LINES,/,4X,30H  +1= VERTICAL GRID LINES ONLY)
 5210 FORMAT (/34H    HOW ARE THE AXES TO BE SCALED?,/,6X,22H1 = LINEAR
     1X, LINEAR Y,/,6X,19H2 = LINEAR X, LOG Y,/,6X,19H3 = LOG X, LINEAR
     2Y,/,6X,16H4 = LOG X, LOG Y)
 5220 FORMAT (/38H    HOW MANY SETS OF DATA ON GRAPH NO.,I2,1H?)
 5230 FORMAT (/39H    LINE/SYMBOL COMBINATION FOR SET NO.,I2,1H:,/,4X,
     147H 0= POINTS CONNECTED BY LINE,NO SYMBOLS PRINTED,/,4X,
     248H+N= POINTS CONNECTED BY LINE, SYMBOLS PRINTED AT,/,4X,
     325H    EVERY N-TH DATA POINT,/,4X,37H-N= NO LINE DRAWN, SYMBOLS PR
     4INTED AT,/,4X,25H    EVERY N-TH DATA POINT)
 5240 FORMAT (/33H    WHAT TYPE OF LINE FOR SET NO.,I2,1H?,/,6X,
     119H1 = SOLID,STRAIGHT ,/,6X,20H2 = DASHED,STRAIGHT ,/,6X,
     216H3 = SOLID,SMOOTH)
 5250 FORMAT (/33H    WHAT TYPE OF LINE FOR SET NO.,I2,1H?,/,6X,
     119H1 = SOLID,STRAIGHT ,/,6X,17H2 = SOLID,SMOOTH )
 5260 FORMAT (/46H    INTEGER EQUIVALENT OF CALCOMP SYMBOL TO BE,/,4X,
```

```
132HPRINTED AT EACH N-TH DATA POINT?)
 5270 FORMAT (/39H    DO YOU WANT A HISTOGRAM FOR SET NO.,I2,1H,,/,4X,
     110HYES OR NO?)
 5280 FORMAT (/50H*** CAUTION: FOR A HISTOGRAM,YOU NEED ONLY SPECIFY,/,
     14X,57H      (1) A LOWER AND UPPER LIMIT FOR THE FIRST BIN, THEN,/,
     24X,54H      (2) AN UPPER LIMIT ONLY FOR EACH BIN THEREAFTER.)
 5290 FORMAT (/35H    ADD YOUR (X,Y) DATA FOR SET NO.,I2,1H:,/,4X,
     117HEND WITH    @EOF                                .)
C
      END
      SUBROUTINE TITLE
C
C  THIS SUBROUTINE WILL DRAW A TITLE IN A 3.5 IN. WIDE BY 1.5 IN. HIGH
C  AREA ANYWHERE ON THE GRAPH (AS DEFINED BY THE USER). THERE IS
C  SPACE AVAILABLE FOR 5 LINES OF CHARACTERS, 25 CHARACTERS/LINE.
C  IF SWITCH IN DATA STATEMENT IS SET TO 1, SYMBOLS WILL BE PRINTED
C  AT THE BEGINNING OF EACH TITLE LINE CORRESPONDING TO THOSE
C  REQUESTED FOR PLOTTING YOUR DATA IN SUBROUTINE READR (INTEQ).
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),
     1ITITL3(5),ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,
     2IGRID,YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA SWITCH/0./
C
      SY=Y2-.25
      SX=X1+.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(1),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL1,0.0,25)
      IF (ILINES.LT.2) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(2),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL2,0.0,25)
      IF (ILINES.LT.3) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(3),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL3,0.0,25)
      IF (ILINES.LT.4) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(4),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL4,0.0,25)
      IF (ILINES.LT.5) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(5),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL5,0.0,25)
 1    RETURN
      END
```


END
DATE
FILMED
7-78
DDC



AD-A054 762 ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND ABERD--ETC F/G 9/2
INTERPOL: AN INTERACTIVE PLOTTING PACKAGE FOR OFF-LINE CAL COMP--ETC(U)
MAR 78 R M SCHWENK, J W KINCH, A E RAINIS

UNCLASSIFIED ARBRL-MR-02818 SBIE-AD-E430 024 NL

END
DATE
FILMED
7-80
DTIC


A
547

SUPPLEMENTARY

INFORMATION

DEPARTMENT OF THE ARMY
U. S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
U. S. ARMY BALLISTIC RESEARCH LABORATORY
ABERDEEN PROVING GROUND, MARYLAND 21005

AD-A054762

DRDAR-TSB

25 JAN 1980

SUBJECT: Corrected Pages to Memorandum Report ARBRL-MR-02818

Commander
Defense Documentation Center
ATTN: DDC-TCA
Cameron Station
Alexandria, VA 22314

1. Inclosed are corrected pages to ARBRL-MR-02818, Titled: "INTERPOL: An Interactive Plotting Package For Off-Line Cal Comp Systems", dated March 1978. Report is UNCLASSIFIED.

2. Copy(s) of subject document were forwarded to your organization on/or about 9 May 1978.

3. Request the inclosed pages be inserted in your copy of ARBRL-MR-02818 and the old pages be destroyed.

FOR THE COMMANDER:

1 Incl
as

VERNON J. WYATT
Chief
Technical Support Division

APPENDIX B

Contained in this appendix is a complete FORTRAN symbolic listing of all INTERPOL subroutines.

```
C                I * N * T * E * R * P * O * L
C
C   A GENERAL PURPOSE 2-DIMENSIONAL/3-DIMENSIONAL PLOTTING ROUTINE
C
C                          R.M. SCHWENK
C                          BRL - APG,MD
C
C   THIS IS THE UNIVAC 1108 VERSION-1. / 27 JAN 78 /
C
C   MAIN ROUTINE FOR 'INTERPOL'
C
C     THE ARRAYS FOR THE (X,Y) DATA ARE ARBITRARILY SET TO 900
C     IN COMMON DATA. THE NUMBER OF SETS OF DATA PER GRAPH
C     IS ARBITRARILY SET TO 20 VIA COMMON DRAW.
C     THE DIMENSION STATEMENT (ICHK) , BELOW , WAS ARBITRARILY SET
C     TO 100 -- I.E., AN ARBITRARY NUMBER OF GRAPHS PER RUN.
C     IT IS SIMPLY USED TO CHECK VERTICAL AXIS LENGTHS FOR PAPER
C     SIZE RESTRICTIONS.
C
C...  THE NEXT CARD IS FOR CDC MACHINES.
C
C     PROGRAM MAIN(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE29)
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA NOU,NIN/6,5/
      DATA IHN,IHY,IHB,IH0/1HN,1HY,1H ,1H0/
C
      DIMENSION ICHK(100)
      WRITE (NOU,5000)
      SKIP=0.
      NPASS=1
  100 CALL READR (NPASS,MASK)
      CALL AXES (MASK)
      IF (MASK.EQ.IHY) GO TO 105
      IF (IGRID.EQ.IHY) CALL NUGRID
      IF (ITITLE.EQ.IHY) CALL TITLE
      CALL PLOTR
      GO TO 110
  105 CALL HIDE (YSTEP)
      YAXIS=YAXIS+YSTEP
```

```
  110  ICHK(NPASS)=YAXIS*FACT
       WRITE (NOU,5010) NPASS
       READ (NIN,5020) IASK
       IF (IASK.EQ.IHN) GO TO 115
       NPASS=NPASS+1
       GO TO 100
  115  CALL PLOT (SKIP,0.0,999)
       WRITE (NOU,5030) NPASS,LDEV
       IPRINT=0
          DO 125 I=1,NPASS
          IF (ICHK(I)-11) 125,125,120
  120     IPRINT=1
  125     CONTINUE
       IF (IPRINT.EQ.1) WRITE (NOU,5050)
       IF (IPRINT.EQ.0) WRITE (NOU,5040)
       WRITE (NOU,5060)
C
C                              *****FORMAT STATEMENTS*****
C
 5000 FORMAT (/47H ** INTERPOL: UNIVAC 1108 VERSION-1 / 27 JAN 78,/,
     135H     FOLLOW PRINTED INSTRUCTIONS.    )
 5010 FORMAT (/22H ** PLOT FOR GRAPH NO.,I2,11H COMPLETED.,//
     141H >> DO YOU WANT TO MAKE ANOTHER GRAPH -- ,10HYES OR NO<)
 5020 FORMAT (A1)
 5030 FORMAT (/3H **,I2,22H GRAPH(S) COMPLETED --,/,4X,9HPLOT FILE,
     118H WRITTEN ON UNIT ",I2,2H".)
 5040 FORMAT (/39H ** PLOT(S) WILL FIT ON "NARROW" PAPER.)
 5050 FORMAT (/43H ** PLOT(S) WILL NOT FIT ON "NARROW" PAPER.,/,4X,
     116HUSE "WIDE" SIZE.)
 5060 FORMAT (/20H ** END OF RUN...../)
C
       END
       SUBROUTINE LOOKUP (X,XTBL,J)
C
C  THIS SUBROUTINE IS CALLED FROM HIDE AS AN EFFICIENT METHOD
C  OF TABLE LOOKUP (STOLEN FROM TRACOR 3-D PLOT PACKAGE).
C
       DIMENSION XTBL(1)
       J=2
  1    IF (XTBL(J)-X) 2,3,4
  2    J=J+1
       GO TO 1
  3    RETURN
  4    J=J-1
       RETURN
       END
       SUBROUTINE FIXUP
C
C THIS ROUTINE SETS ANY DATA WHICH IS TO BE LOGARITHMICALLY SCALED
```

```
C AND WAS FOUND TO BE EQUAL TO ZERO TO THE MINIMUM OF THE RESPECTIVE
C X OR Y ARRAY. THIS PREVENTS AN ABORTED RUN. THE USER IS TOLD.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IHO
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
         DO 1 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 1       CONTINUE
       XMIN=1.0E+29
       YMIN=1.0E+29
         DO 2 I=1,ITOT
         XMIN=AMIN1(XMIN,XARRAY(I))
         YMIN=AMIN1(YMIN,YARRAY(I))
 2       CONTINUE
       IF (XMIN.EQ.0.) XMIN=XMIN+.0001
       IF (YMIN.EQ.0.) YMIN=YMIN+.0001
       L=ITYPE-1
       GO TO (3,5,7), L
 3       DO 4 I=1,ITOT
         IF (YARRAY(I).EQ.0.) YARRAY(I)=YMIN
 4       CONTINUE
       GO TO 9
 5       DO 6 I=1,ITOT
         IF (XARRAY(I).EQ.0.) XARRAY(I)=XMIN
 6       CONTINUE
       GO TO 9
 7       DO 8 I=1,ITOT
         IF (XARRAY(I).EQ.0.) XARRAY(I)=XMIN
         IF (YARRAY(I).EQ.0.) YARRAY(I)=YMIN
 8       CONTINUE
 9     CONTINUE
       WRITE (NOU,10)
       RETURN
C
C                          *****FORMAT STATEMENTS*****
C
 10    FORMAT (/51H ** INPUT WARNING: ZERO'S ENCOUNTERED ON LOGARITHMI,
     119HCALLY SCALED DATA--,/,36H    VALUES WERE RE-SET TO MINIMUM OF,
     233H RESPECTIVE ARRAY (XMIN OR YMIN).)
C
       END
```

```
      SUBROUTINE INIT
C
C   THIS SUBROUTINE INITIALIZES THE PLOTTER. THE (X,Y) COORDINATES
C   IN THE DATA STATEMENT SET THE POSITION OF THE GRAPH'S ORIGIN
C   ON THE PAPER (I.E., LOWER LEFT HAND CORNER).
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA X,Y/3.0,2.0/
C
      CALL PLOTS (IBUFF,NLOC,LDEV)
      CALL PLOT (0.0,-36.0,-3)
      CALL PLOT (X,Y,-3)
      RETURN
      END
      SUBROUTINE FACTR
C
C   THIS SUBROUTINE CHANGES THE LENGTH OF ALL PEN MOVEMENTS BY A
C   USER SUPPLIED SCALING FACTOR (SUBR. READR). 1.0 IS FULL SCALE.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),
     1ITITL3(5),ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,
     2IGRID,YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      CALL FACTOR (FACT)
      RETURN
      END
      SUBROUTINE NUGRID
C
C   THIS SUBROUTINE DRAWS GRID LINES AS REQUESTED BY THE USER. IT
C   WILL NOT DRAW THROUGH THE TITLE. ZINC IS THE INCREMENT BY WHICH
C   THE PLOT PEN CHECKS TO SEE IF IT IS WITHIN THE TITLE BOUNDARIES
C   SET UP BY SUBROUTINE TITLE.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
```

```
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      DATA ZINC/0.1/
C
      IF (ILINES.EQ.0) GO TO 125
      GO TO (100,105,110,115,120), ILINES
  100 Y1=Y2-.3
      GO TO 125
  105 Y1=Y2-.6
      GO TO 125
  110 Y1=Y2-.9
      GO TO 125
  115 Y1=Y2-1.2
      GO TO 125
  120 Y1=Y2-1.5
  125 CONTINUE
      X2=X1+3.75
C
C...  DRAWS VERTICAL GRID LINES.
C
      ITOT=0
         DO 130 I=1,NSETS
         ITOT=ITOT+NPTS(I)
  130    CONTINUE
      IF (XINC.EQ.0.0) GO TO 160
      IF (ITYPE.EQ.1.OR.ITYPE.EQ.2) XINC=1.
      IF (ITYPE.EQ.3.OR.ITYPE.EQ.4) XINC=1./XARRAY(ITOT+2)
      X=XINC
      ICOUNT=XAXIS/XINC
      JCOUNT=YAXIS/ZINC
         DO 155 I=1,ICOUNT
         Y=0.0
         CALL PLOT (X,Y,3)
            DO 150 J=1,JCOUNT
            Y=Y+ZINC
            IF (X.GE.X1.AND.X.LE.X2) GO TO 135
            GO TO 140
  135       IF (Y.GE.Y1.AND.Y.LE.Y2) GO TO 145
  140       CALL PLOT (X,Y,2)
            GO TO 150
  145       CALL PLOT (X,Y,3)
  150       CONTINUE
```

```
          X=X+XINC
  155     CONTINUE
C
C...  DRAWS HORIZONTAL GRID LINES.
C
      IF (YINC.EQ.0.0) GO TO 190
  160 IF (ITYPE.EQ.1.OR.ITYPE.EQ.3) YINC=1.
      IF (ITYPE.EQ.2.OR.ITYPE.EQ.4) YINC=1./YARRAY(ITOT+2)
      Y=YINC
      KCOUNT=YAXIS/YINC
      LCOUNT=XAXIS/ZINC
         DO 185 K=1,KCOUNT
         X=0.0
         CALL PLOT (X,Y,3)
            DO 180 L=1,LCOUNT
            X=X+ZINC
            IF (Y.GE.Y1.AND.Y.LE.Y2) GO TO 165
            GO TO 170
  165       IF (X.GE.X1.AND.X.LE.X2) GO TO 175
  170       CALL PLOT (X,Y,2)
            GO TO 180
  175       CALL PLOT (X,Y,3)
  180       CONTINUE
         Y=Y+YINC
  185    CONTINUE
  190 RETURN
      END
      SUBROUTINE TITLE
C
C  THIS SUBROUTINE WILL DRAW A TITLE IN A 3.5 IN. WIDE BY 1.5 IN. HIGH
C  AREA ANYWHERE ON THE GRAPH (AS DEFINED BY THE USER). THERE IS
C  SPACE AVAILABLE FOR 5 LINES OF CHARACTERS, 25 CHARACTERS/LINE.
C  IF SWITCH IN DATA STATEMENT IS SET TO 1, SYMBOLS WILL BE PRINTED
C  AT THE BEGINNING OF EACH TITLE LINE CORRESPONDING TO THOSE
C  REQUESTED FOR PLOTTING YOUR DATA IN SUBROUTINE READR (INTEQ).
C
       COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),
     1ITITL3(5),ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,
     2IGRID,YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
       COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
       COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
       DATA SWITCH/0./
C
       SY=Y2-.25
```

```
      SX=X1+.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(1),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL1,0.0,25)
      IF (ILINES.LT.2) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(2),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL2,0.0,25)
      IF (ILINES.LT.3) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(3),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL3,0.0,25)
      IF (ILINES.LT.4) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(4),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL4,0.0,25)
      IF (ILINES.LT.5) GO TO 1
      SY=SY-.25
      IF (SWITCH.EQ.1.) CALL SYMBOL (SX,SY+.05,0.14,INTEQ(5),0.0,-1)
      CALL SYMBOL (SX,SY,0.14,ITITL5,0.0,25)
 1    RETURN
      END
      SUBROUTINE AXES (MASK)
C
C  THIS SUBROUTINE SCALES ALL DATA AND DRAWS THE APPROPRIATE AXES
C  WITH LABELS AS WELL AS THE GRAPH'S BORDER.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      ITOT=0
         DO 100 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 100     CONTINUE
      GO TO (105,110,115,120), ITYPE
C
C...  ITYPE=1  ---->   LINEAR X,LINEAR Y SCALED AXES.
C
 105  CALL SCALE (XARRAY,XAXIS,ITOT,1)
      CALL SCALE (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL AXIS (0.0,0.0,IXAXIS,-.25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
```

```
      CALL AXIS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=2  ---->   LINEAR X,LOG Y SCALED AXES.
C
 110  CALL SCALE (XARRAY,XAXIS,ITOT,1)
      CALL SCALG (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL AXIS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL LGAXS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=3  ---->   LOG X,LINEAR Y SCALED AXES.
C
 115  CALL SCALG (XARRAY,XAXIS,ITOT,1)
      CALL SCALE (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL LGAXS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL AXIS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
      GO TO 125
C
C...  ITYPE=4  ---->   LOG X,LOG Y SCALED AXES.
C
 120  CALL SCALG (XARRAY,XAXIS,ITOT,1)
      CALL SCALG (YARRAY,YAXIS,ITOT,1)
      IF (MASK.EQ.IHY) GO TO 125
      CALL LGAXS (0.0,0.0,IXAXIS,-25,XAXIS,0.0,XARRAY(ITOT+1),
     1XARRAY(ITOT+2))
      CALL LGAXS (0.0,0.0,IYAXIS,25,YAXIS,90.0,YARRAY(ITOT+1),
     1YARRAY(ITOT+2))
      CALL PLOT (0.0,YAXIS,3)
      CALL PLOT (XAXIS,YAXIS,2)
      CALL PLOT (XAXIS,0.0,2)
 125  RETURN
      END
```

```
      SUBROUTINE PLOTR
C
C  THIS SUBROUTINE SETS UP THE DATA ARRAYS WITH APPROPRIATE SCALING
C  FACTORS (COMPUTED IN SUBR. AXES),GENERATES HISTOGRAMS IF REQUESTED
C  AND THEN PLOTS ALL DATA AS INPUT IN SUBROUTINE READR.
C
C  THIS ROUTINE IS ALSO NEXT TO IMPOSSIBLE TO EXPLAIN OR FOLLOW!
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
      SKIP=XAXIS+4.0
      JN=1
      JO=0
      ITOT=0
         DO 100 I=1,NSETS
         ITOT=ITOT+NPTS(I)
 100     CONTINUE
C
         DO 255 JM=1,NSETS
         L=IPLOT(JM)
         JO=JO+NPTS(JM)
         IK=1
            DO 130 IJ=JN,JO
            XPTS(IK)=XARRAY(IJ)
            YPTS(IK)=YARRAY(IJ)
            IF (IPLOT(JM).GE.5) GO TO 105
            ITOT=ITOT
            GO TO 125
 105        IF (LOGTYP(JM)) 120,115,110
 110        ANUX(IK)=XARRAY(IJ)
            ANUY(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/
     1      YARRAY(ITOT+2)
            GO TO 125
 115        ANUX(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/
     1      XARRAY(ITOT+2)
            ANUY(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/
     1      YARRAY(ITOT+2)
            GO TO 125
 120        ANUX(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/
     1      XARRAY(ITOT+2)
            ANUY(IK)=YARRAY(IJ)
```

```
            GO TO 125
  125       IK=IK+1
  130       CONTINUE
          XPTS(IK)=XARRAY(ITOT+1)
          XPTS(IK+1)=XARRAY(ITOT+2)
          YPTS(IK)=YARRAY(ITOT+1)
          YPTS(IK+1)=YARRAY(ITOT+2)
          IF (IPLOT(JM).GE.5) GO TO 135
          GO TO 155
  135     IF (LOGTYP(JM)) 150,145,140
  140     ANUX(IK)=XARRAY(ITOT+1)
          ANUX(IK+1)=XARRAY(ITOT+2)
          ANUY(IK)=0.0
          ANUY(IK+1)=1.0
          GO TO 155
  145     ANUX(IK)=0.
          ANUX(IK+1)=1.
          ANUY(IK)=0.
          ANUY(IK+1)=1.
          GO TO 155
  150     ANUX(IK)=0.
          ANUX(IK+1)=1.
          ANUY(IK)=YARRAY(ITOT+1)
          ANUY(IK+1)=YARRAY(ITOT+2)
          GO TO 155
  155     JN=JN+NPTS(JM)
C
C...  SECTION TO GENERATE/PLOT NEW ARRAYS FOR HISTOGRAM.
C
          IF (IPLOT(JM).EQ.3.OR.IPLOT(JM).EQ.6.OR.IHIST(JM).EQ.IHN)
     1     GO TO 220
          IF (IPLOT(JM).EQ.5) GO TO 160
          GO TO 185
  160     JZ=3
          ANUHX(1)=ANUX(1)
          ANUHY(1)=ANUY(1)
          ANUHX(2)=ANUX(2)
          ANUHY(2)=ANUY(2)
          KZ=NPTS(JM)-1
             DO 165 IZ=2,KZ
             ANUHX(JZ)=ANUX(IZ)
             ANUHY(JZ)=ANUY(IZ+1)
             JZ=JZ+1
             ANUHX(JZ)=ANUX(IZ+1)
             ANUHY(JZ)=ANUY(IZ+1)
             JZ=JZ+1
  165        CONTINUE
          IF (LOGTYP(JM)) 180,175,170
  170     ANUHX(JZ)=XARRAY(ITOT+1)
```

```
      ANUHX(JZ+1)=XARRAY(ITOT+2)
      ANUHY(JZ)=0.0
      ANUHY(JZ+1)=1.0
      GO TO 195
175   ANUHX(JZ)=0.0
      ANUHX(JZ+1)=1.0
      ANUHY(JZ)=0.0
      ANUHY(JZ+1)=1.0
      GO TO 195
180   ANUHX(JZ)=0.0
      ANUHX(JZ+1)=1.0
      ANUHY(JZ)=YARRAY(ITOT+1)
      ANUHY(JZ+1)=YARRAY(ITOT+2)
      GO TO 195
185   J=3
      HISTOX(1)=XPTS(1)
      HISTOY(1)=YPTS(1)
      HISTOX(2)=XPTS(2)
      HISTOY(2)=YPTS(2)
      KK=NPTS(JM)-1
         DO 190 I=2,KK
         HISTOX(J)=XPTS(I)
         HISTOY(J)=YPTS(I+1)
         J=J+1
         HISTOX(J)=XPTS(I+1)
         HISTOY(J)=YPTS(I+1)
         J=J+1
190      CONTINUE
      HISTOX(J)=XARRAY(ITOT+1)
      HISTOX(J+1)=XARRAY(ITOT+2)
      HISTOY(J)=YARRAY(ITOT+1)
      HISTOY(J+1)=YARRAY(ITOT+2)
195   NPT=(NPTS(JM)*2)-2
      GO TO (200,205,255,210,215,255), L
200   CALL LINE (HISTOX,HISTOY,NPT,1,LINTYP(JM),INTEQ(JM))
      GO TO 255
205   CALL DASHL (HISTOX,HISTOY,NPT,1)
      GO TO 255
210   CALL LGLIN (HISTOX,HISTOY,NPT,1,LINTYP(JM),INTEQ(JM),LOGTYP(JM)
     1   )
      GO TO 255
215   CALL DASHL (ANUHX,ANUHY,NPT,1)
      GO TO 255
C
C...  SECTION FOR PLOTTING REGULAR DATA (NO HISTOGRAMS).
C
C     IPLOT=1 ----> STRAIGHT LINE:LINEAR AXES
C     IPLOT=2 ----> DASH LINE:LINEAR AXES ONLY
C     IPLOT=3 ----> SMOOTH LINE:LINEAR AXES
```

```
C      IPLOT=4 ----> STRAIGHT LINE:LOG-LOG,SEMI-LOG AXES
C      IPLOT=5 ----> DASH LINE:LOG-LOG,SEMI-LOG AXES
C      IPLOT=6 ----> SMOOTH LINE:LOG-LOG,SEMI-LOG AXES
C
 220      GO TO (225,230,235,240,245,250), L
 225      CALL LINE (XPTS,YPTS,NPTS(JM),1,LINTYP(JM),INTEQ(JM))
          GO TO 255
 230      CALL DASHL (XPTS,YPTS,NPTS(JM),1)
          GO TO 255
 235      CALL FLINE (XPTS,YPTS,-NPTS(JM),1,LINTYP(JM),INTEQ(JM))
          GO TO 255
 240      CALL LGLIN (XPTS,YPTS,NPTS(JM),1,LINTYP(JM),INTEQ(JM),
     1    LOGTYP(JM))
          GO TO 255
 245      CALL DASHL (ANUX,ANUY,NPTS(JM),1)
          GO TO 255
 250      CALL FLINE (ANUX,ANUY,-NPTS(JM),1,LINTYP(JM),INTEQ(JM))
 255      CONTINUE
       CALL PLOT (XAXIS,0.0,3)
       CALL PLOT (SKIP,0.0,-3)
       RETURN
       END
       SUBROUTINE HIDE (YSTEP)
C
C  THIS ROUTINE PLOTS THE 3-DIMENSIONAL GRAPH.
C
       COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
      1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
      2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
       COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
      1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
       COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
      1LOGTYP(20),SKIP
C
       DIMENSION X(900),Y(900),XG(900),G(900),XH(900),H(900)
       EQUIVALENCE (K1,IWHICH), (K2,SLOPE), (FNSM1,Z1), (IGGP1,K1), (K1,
      1N2)
       DATA EPS1,MAXDIM,XSTART,YSTART/1.E-9,900,4.,3./
       F(XX,XI,YI,XIP1,YIP1)=YI+(XX-XI)*(YIP1-YI)/(XIP1-XI)
       WRITE (NOU,5000)
       READ (NIN,5030) IDASH
       YSTEP=YSTART
       SKIP=XAXIS+4.0
       JN=1
       JO=0
       NG=0
       ITOT=0
```

```
      DO 100 I=1,NSETS
      ITOT=ITOT+NPTS(I)
100   CONTINUE
C
      DO 355 JM=1,NSETS
      N1=NPTS(JM)
      JO=JO+N1
      IK=1
         DO 130 IJ=JN,JO
         ITOT=ITOT
         GO TO (120,105,110,115), ITYPE
105      Y(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/YARRAY(ITOT+
     1   2)
         X(IK)=XARRAY(IJ)
         GO TO 125
110      X(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/XARRAY(ITOT+
     1   2)
         Y(IK)=YARRAY(IJ)
         GO TO 125
115      X(IK)=(LOG10(XARRAY(IJ))-LOG10(XARRAY(ITOT+1)))/XARRAY(ITOT+
     1   2)
         Y(IK)=(LOG10(YARRAY(IJ))-LOG10(YARRAY(ITOT+1)))/YARRAY(ITOT+
     1   2)
         GO TO 125
120      X(IK)=XARRAY(IJ)
         Y(IK)=YARRAY(IJ)
125      IK=IK+1
130      CONTINUE
      JN=JN+N1
         DO 135 I=2,N1
         IF (X(I-1).LT.X(I)) GO TO 135
         WRITE (NOU,5010) X(I-1),X(I)
         RETURN
135      CONTINUE
      IF (JM.GT.1) GO TO 205
      NFNS=NSETS
      XMIN=XARRAY(ITOT+1)
      YMIN=YARRAY(ITOT+1)
      DELTAX=XARRAY(ITOT+2)
      DELTAY=YARRAY(ITOT+2)
      IF (N1+4.LE.MAXDIM) GO TO 140
      GO TO 360
140   SIGN=1.
      IF (NG.LT.-1) SIGN=-1.
      IF (NG.EQ.-1.OR.NG.EQ.-3) GO TO 145
      CALL PLOT (0.,YSTART+YAXIS,3)
      CALL DASHP (XAXIS,YSTART+YAXIS,.03)
      CALL DASHP (XAXIS,YSTART,.03)
      CALL DASHP (0.,YSTART,.03)
```

```
      CALL PLOT (XAXIS,YSTART,3)
      CALL DASHP (XAXIS+XSTART,0.,.03)
145   CALL SYMBOL (2.0,YAXIS+YSTART+.10,.14,ITITL1,0.,25)
      GO TO (150,155,160,165), ITYPE
150   CALL AXIS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
      CALL PLOT (XSTART,0.,3)
      CALL PLOT (0.,YSTART,2)
      CALL AXIS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
      GO TO 170
155   CALL AXIS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
      CALL PLOT (XSTART,0.,3)
      CALL PLOT (0.,YSTART,2)
      CALL LGAXS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
      GO TO 170
160   CALL LGAXS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
      CALL PLOT (XSTART,0.,3)
      CALL PLOT (0.,YSTART,2)
      CALL AXIS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
      GO TO 170
165   CALL LGAXS (XSTART,0.,IXAXIS,-25,XAXIS,0.,XMIN,DELTAX)
      CALL PLOT (XSTART,0.,3)
      CALL PLOT (0.,YSTART,2)
      CALL LGAXS (0.,YSTART,IYAXIS,25,YAXIS,90.,YMIN,DELTAY)
170   INDEXT=3
      GO TO (190,175,180,185), ITYPE
175   YMIN=0.
      DELTAY=1.
      GO TO 190
180   XMIN=0.
      DELTAX=1.
      GO TO 190
185   XMIN=0.
      DELTAX=1.
      YMIN=0.
      DELTAY=1.
190   CONTINUE
      IF (NFNS.LE.0) GO TO 195
      FNSM1=NFNS-1
      DXIN=XSTART*DELTAX/FNSM1
      DYIN=YSTART*DELTAY/FNSM1
195      DO 200 J=1,N1
         XG(INDEXT)=X(J)
         G(INDEXT)=SIGN*Y(J)
         INDEXT=INDEXT+1
200      CONTINUE
      EPS=EPS1*(ABS(XMIN)+ABS(DELTAX))
      NG=N1+4
      XG(1)=-FNSM1*DXIN+XMIN-ABS(XMIN)-ABS(XG(3))-1.
      XG(2)=XG(3)-EPS
```

```
      XG(N1+3)=XG(N1+2)+EPS
      ZZ=YMIN
      IF (SIGN.LT.0.) ZZ=-YMIN-50.*DELTAY
      G(1)=ZZ
      G(2)=ZZ
      G(N1+3)=ZZ
      G(NG)=ZZ
      CALL PLOT (XSTART,0.,-3)
      X(N1+1)=XMIN
      X(N1+2)=DELTAX
      Y(N1+1)=YMIN
      Y(N1+2)=DELTAY
      CALL LINE (X,Y,N1,1,0,0)
      DXKK=0.
      DYKK=0.
      RELINC=DELTAX/DELTAY
      XG(NG)=SIGN
      GO TO 355
205   SIGN=XG(NG)
      XG(NG)=X(N1)
      IF (NFNS) 225,215,210
210   DXKK=DXKK+DXIN
      DYKK=DYKK+DYIN
215      DO 220 J=1,N1
         Y(J)=SIGN*(Y(J)+DYKK)
         X(J)=X(J)-DXKK
220      CONTINUE
225   CALL LOOKUP (X(1),XG(1),JJ)
      IF (JJ.GE.MAXDIM) GO TO 360
         DO 230 J=1,JJ
         XH(J)=XG(J)
         H(J)=G(J)
230      CONTINUE
      IG=JJ+1
      XH(IG)=X(1)
      H(IG)=F(X(1),XG(JJ),G(JJ),XG(IG),G(IG))
      INDEXG=JJ
      INDEXT=1
      Z1=X(1)
      F1=H(IG)-Y(1)
      IT=2
      JJ=IG
      IF (H(IG).GE.Y(1)) GO TO 235
      IF (JJ.GE.MAXDIM) GO TO 360
      JJ=IG+1
      H(JJ)=Y(1)
      XH(JJ)=Z1+EPS
235   LAST=0
      X1=Z1
```

```
240     IF (XG(IG).LT.X(IT)) GO TO 245
        IWHICH=0
        X2=X(IT)
        F2=F(X2,XG(IG-1),G(IG-1),XG(IG),G(IG))-Y(IT)
        IT=IT+1
        GO TO 250
245     X2=XG(IG)
        IWHICH=1
        F2=G(IG)-F(X2,X(IT-1),Y(IT-1),X(IT),Y(IT))
        IG=IG+1
250     IF (F1*F2.GT.0.) GO TO 260
        DENOM=X2-X1
        IF (DENOM.EQ.0.) DENOM=.00001
        SLOPE=(F2-F1)/DENOM
        IGG=IG-1-IWHICH
        ITT=IT-2+IWHICH
        IF (ABS(SLOPE*RELINC).GT.1.E-6) GO TO 255
        Z2=X2
        GO TO 270
255     Z2=X1-F1/SLOPE
        GO TO 270
260     X1=X2
        F1=F2
        IF (IT.LE.N1) GO TO 240
265     LAST=1
        Z2=X(N1)
        CALL LOOKUP (Z2,XG(INDEXG),IGG)
        IGG=INDEXG+IGG-1
        ITT=N1-1
270     ZZ=.99*Z1+.01*Z2
        CALL LOOKUP (ZZ,X(INDEXT),K1)
        CALL LOOKUP (ZZ,XG(INDEXG),K2)
        K1=K1+INDEXT-1
        K2=K2+INDEXG-1
        IF (F(ZZ,X(K1),Y(K1),X(K1+1),Y(K1+1)).GT.F(ZZ,XG(K2),G(K2),
    1   XG(K2+1),G(K2+1))) GO TO 300
        IF (JJ+IGG-INDEXG.GE.MAXDIM) GO TO 360
        NGR=ITT-INDEXT+2
        NN2=JJ
        NJJ=JJ
        ANUX(NJJ)=XH(NJJ)
        ANUY(NJJ)=H(NJJ)
        IF (NGR.EQ.2) GO TO 280
        NJ1=INDEXT+1
           DO 275 I=NJ1,ITT
           NJJ=NJJ+1
           ANUX(NJJ)=X(I)
           ANUY(NJJ)=Y(I)
275        CONTINUE
```

```
280       NJJ=NJJ+1
          ANUX(NJJ)=Z2
          ANUY(NJJ)=F(Z2,X(ITT),Y(ITT),X(ITT+1),Y(ITT+1))
          NNM=NN2+NGR-1
          NL=0
             DO 285 I=NN2,NNM
             NL=NL+1
             ANUHX(NL)=ANUX(I)
             ANUHY(NL)=ANUY(I)
285          CONTINUE
          ANUHX(NL+1)=XMIN
          ANUHY(NL+1)=YMIN
          ANUHY(NL+2)=DELTAY
          ANUHX(NL+2)=DELTAX
          IF (IDASH.EQ.IHY) CALL DASHL (ANUHX,ANUHY,NL,1)
          IF (INDEXG.EQ.IGG) GO TO 295
          J1=INDEXG+1
             DO 290 I=J1,IGG
             JJ=JJ+1
             XH(JJ)=XG(I)
             H(JJ)=G(I)
290          CONTINUE
295       JJ=JJ+1
          XH(JJ)=Z2
          H(JJ)=F(Z2,XG(IGG),G(IGG),XG(IGG+1),G(IGG+1))
          INDEXG=IGG
          INDEXT=ITT
          GO TO 320
300       NGRAPH=ITT-INDEXT+2
          IF (JJ+NGRAPH-1.GT.MAXDIM) GO TO 360
          N2=JJ
          IF (NGRAPH.EQ.2) GO TO 310
          J1=INDEXT+1
             DO 305 I=J1,ITT
             JJ=JJ+1
             XH(JJ)=X(I)
             H(JJ)=Y(I)
305          CONTINUE
310       JJ=JJ+1
          XH(JJ)=Z2
          H(JJ)=F(Z2,X(ITT),Y(ITT),X(ITT+1),Y(ITT+1))
          NM=N2+NGRAPH-1
          L=0
             DO 315 I=N2,NM
             L=L+1
             XPTS(L)=XH(I)
             YPTS(L)=H(I)
315          CONTINUE
          XPTS(L+1)=XMIN
```

```
      XPTS(L+2)=DELTAX
      YPTS(L+1)=SIGN*YMIN
      YPTS(L+2)=SIGN*DELTAY
      CALL LINE (XPTS,YPTS,L,1,0,0)
      INDEXT=ITT
      INDEXG=IGG
320   IF (LAST.EQ.1) GO TO 325
      X1=X2
      F1=F2
      Z1=Z2
      IF (IT.LE.N1) GO TO 240
      GO TO 265
325   IF (XG(NG).LE.XG(NG-1)) NG=NG-1
      IF (XG(NG).LE.X(N1)) GO TO 335
      IF (JJ+3+NG-IGG.GT.MAXDIM) GO TO 360
      XH(JJ+1)=XH(JJ)+EPS
      JJ=JJ+1
      H(JJ)=F(X(N1),XG(IGG),G(IGG),XG(IGG+1),G(IGG+1))
      IGGP1=IGG+1
         DO 330 J=IGGP1,NG
         JJ=JJ+1
         XH(JJ)=XG(J)
         H(JJ)=G(J)
330      CONTINUE
335   NG=JJ+2
      IF (NG.GE.MAXDIM) GO TO 360
         DO 340 I=1,JJ
         G(I)=H(I)
         XG(I)=XH(I)
340      CONTINUE
      XG(JJ+1)=XG(JJ)+EPS
      G(JJ+1)=YMIN+DYKK
      IF (SIGN.LT.0.) G(JJ+1)=-YMIN-50.*DELTAY+DYKK
      G(NG)=G(JJ+1)
      IF (NFNS.LT.0) GO TO 350
         DO 345 I=1,N1
         X(I)=X(I)+DXKK
         Y(I)=SIGN*Y(I)-DYKK
345      CONTINUE
350   XG(NG)=SIGN
355   CONTINUE
      CALL PLOT (XAXIS,0.0,3)
      CALL PLOT (SKIP,0.0,-3)
      RETURN
360   WRITE (6,5020) MAXDIM
      RETURN
C
C                          *****FORMAT STATEMENTS*****
C
```

```
 5000 FORMAT (/37H >> DO YOU WANT ANY "HIDDEN" 3-D DATA,/4X,
     140HPLOTTED WITH A DASHED LINE -- YES OR NO<)
 5010 FORMAT (/33H ** INPUT ERROR (HIDE): X(I-1) = ,1PE10.4,5X,6HX(I) =,
     11X,1PE10.4,/,35H       X(I-1) MUST BE LESS THAN X(I))
 5020 FORMAT (/48H ** ERROR IN DIMENSIONED ARRAYS (HIDE): MAXDIM =,I4./,
     135H    INCREASE MAXDIM TO RUN PROBLEM.)
 5030 FORMAT (A1)
C
      END
      SUBROUTINE READR (NPASS,MASK)
C
C  THIS SUBROUTINE HANDLES THE INTERACTIVE I/O - - READS IN PLOT
C  INSTRUCTIONS AS WELL AS THE DATA.
C
      COMMON /INPUT/ IXAXIS(5),IYAXIS(5),ITITL1(5),ITITL2(5),ITITL3(5),
     1ITITL4(5),ITITL5(5),ITYPE,XAXIS,YAXIS,FACT,ITITLE,Y2,X1,IGRID,
     2YINC,XINC,NOU,NIN,ILINES,LDEV,NSETS,IHN,IHY,IHB,IH0
C
      COMMON /DATA/ XARRAY(900),YARRAY(900),HISTOX(900),HISTOY(900),
     1XPTS(900),YPTS(900),ANUX(900),ANUY(900),ANUHX(900),ANUHY(900)
C
      COMMON /DRAW/ NPTS(20),IPLOT(20),IHIST(20),LINTYP(20),INTEQ(20),
     1LOGTYP(20),SKIP
C
C...  THE FOLLOWING 3 CARDS ARE FOR UNIVAC MACHINES.
C
      DIMENSION IA(2)
      IA(1)=6H@ASG,T
      IA(2)=6H 29.
C
      IF ((NPASS).GT.1) GO TO 125
  100 WRITE (NOU,5060)
      READ (NIN,5030,ERR=105) LDEV
      GO TO 110
  105 WRITE (NOU,5020)
      GO TO 100
C
C...  THE FOLLOWING 4 CARDS ARE FOR UNIVAC MACHINES.
C
  110 IF (LDEV.EQ.0) GO TO 115
      GO TO 120
  115 CALL ERTRAN (6,IA)
      LDEV=29
C
C...  THE FOLLOWING CARD WOULD BE USED FOR CDC MACHINES.
C
C3    IF (LDEV.EQ.0) LDEV=29
C
  120 CALL INIT
```

```
125   WRITE (NOU,5070) NPASS
      WRITE (NOU,5080)
      READ (NIN,5050) MASK
130   WRITE (NOU,5090)
      READ (NIN,5030,ERR=135) XAXIS
      GO TO 140
135   WRITE (NOU,5020)
      GO TO 130
140   IF (XAXIS.EQ.0) XAXIS=9
145   WRITE (NOU,5100)
      READ (NIN,5030,ERR=150) YAXIS
      GO TO 155
150   WRITE (NOU,5020)
      GO TO 145
155   IF (YAXIS.EQ.0) YAXIS=7
160   WRITE (NOU,5110)
      READ (NIN,5030,ERR=165) FACT
      IF (FACT.EQ.0.) FACT=1.
      IF (FACT.GT.0.) GO TO 170
      WRITE (NOU,5120)
      GO TO 160
165   WRITE (NOU,5020)
      GO TO 160
170   CALL FACTR
      IF (MASK.NE.IHY) GO TO 175
      WRITE (NOU,5010)
      READ (NIN,5040) ITITL1
      GO TO 235
175   WRITE (NOU,5130)
      READ (NIN,5050) ITITLE
      IF (ITITLE.EQ.IHN.OR.ITITLE.EQ.IHB.OR.ITITLE.EQ.IH0) GO TO 235
180   WRITE (NOU,5140)
      READ (NIN,5030,ERR=185) X1,Y2
      GO TO 190
185   WRITE (NOU,5020)
      GO TO 180
190   WRITE (NOU,5150)
      READ (NIN,5030,ERR=195) ILINES
      GO TO 200
195   WRITE (NOU,5020)
      GO TO 190
200   WRITE (NOU,5160) ILINES
         DO 230 I=1,ILINES
         GO TO (205,210,215,220,225), I
205      READ (NIN,5040) ITITL1
         GO TO 230
210      READ (NIN,5040) ITITL2
         GO TO 230
215      READ (NIN,5040) ITITL3
```

```
          GO TO 230
220       READ (NIN,5040) ITITL4
          GO TO 230
225       READ (NIN,5040) ITITL5
230       CONTINUE
235   WRITE (NOU,5170)
      READ (NIN,5040) IXAXIS
      WRITE (NOU,5180)
      READ (NIN,5040) IYAXIS
      IF (MASK.EQ.IHY) GO TO 255
      WRITE (NOU,5190)
      READ (NIN,5050) IGRID
      IF (IGRID.EQ.IHN.OR.IGRID.EQ.IHB.OR.IGRID.EQ.IH0) GO TO 255
240   WRITE (NOU,5200)
      READ (NIN,5030,ERR=245) LGRID
      GO TO 250
245   WRITE (NOU,5020)
      GO TO 240
250   XINC=10.
      YINC=10.
      IF (LGRID.LT.0) XINC=0.
      IF (LGRID.GT.0) YINC=0.
255   WRITE (NOU,5210)
      READ (NIN,5030,ERR=260) ITYPE
      GO TO 265
260   WRITE (NOU,5020)
      GO TO 255
265   WRITE (NOU,5220) NPASS
      READ (NIN,5030,ERR=270) NSETS
      GO TO 275
270   WRITE (NOU,5020)
      GO TO 265
275   II=0
          DO 375 K=1,NSETS
          IF (MASK.EQ.IHY.AND.K.EQ.1) WRITE (NOU,5000)
          IF (MASK.EQ.IHY) GO TO 360
280       WRITE (NOU,5230) K
          READ (NIN,5030,ERR=285) LINTYP(K)
          GO TO 290
285       WRITE (NOU,5020)
          GO TO 280
290       IF (LINTYP(K).GE.0) GO TO 295
          IF (ITYPE.EQ.1) IPLOT(K)=1
          IF (ITYPE.GT.1) IPLOT(K)=4
          IF (ITYPE.EQ.2) LOGTYP(K)=1
          IF (ITYPE.EQ.3) LOGTYP(K)=-1
          IF (ITYPE.EQ.4) LOGTYP(K)=0
          GO TO 330
295       IF (LINTYP(K).GT.0) GO TO 315
```

```
 300      WRITE (NOU,5240) K
          READ (NIN,5030,ERR=305) IPLOT(K)
          GO TO 310
 305      WRITE (NOU,5020)
          GO TO 300
 310      IF (ITYPE.GT.1) IPLOT(K)=IPLOT(K)+3
          IF (ITYPE.EQ.2) LOGTYP(K)=1
          IF (ITYPE.EQ.3) LOGTYP(K)=-1
          IF (ITYPE.EQ.4) LOGTYP(K)=0
          GO TO 340
 315      WRITE (NOU,5250) K
          READ (NIN,5030,ERR=320) IPLOT(K)
          GO TO 325
 320      WRITE (NOU,5020)
          GO TO 315
 325      IF (IPLOT(K).EQ.2) IPLOT(K)=3
          IF (ITYPE.GT.1) IPLOT(K)=IPLOT(K)+3
          IF (ITYPE.EQ.2) LOGTYP(K)=1
          IF (ITYPE.EQ.3) LOGTYP(K)=-1
          IF (ITYPE.EQ.4) LOGTYP(K)=0
 330      WRITE (NOU,5260)
          READ (NIN,5030,ERR=335) INTEQ(K)
          GO TO 340
 335      WRITE (NOU,5020)
          GO TO 330
 340      IF (IPLOT(K).EQ.3.OR.IPLOT(K).EQ.6) GO TO 360
 345      WRITE (NOU,5270) K
          READ (NIN,5050,ERR=350) IHIST(K)
          GO TO 355
 350      WRITE (NOU,5020)
          GO TO 345
 355  IF (IHIST(K).NE.IHY)IHIST(K)=IHN
          IF (IHIST(K).EQ.IHY) WRITE (NOU,5280)
 360      WRITE (NOU,5290) K
          KFIX=0
C
C...  THE FOLLOWING LOOP READS THE (X,Y) DATA.
C
               DO 365 I=1,100000
               II=II+1
C
C...  UNIVAC FORMATTED READ.
C
               READ (NIN,5030,END=370) XARRAY(II),YARRAY(II)
C
C...  CDC READ WITH 2-BRANCH EOF CHECK.
C
C              READ(NIN,1000)XARRAY(II),YARRAY(II)
C              IF(EOF(NIN))54,100
```

```
C100          IF(ITYPE.EQ.3.AND.XARRAY(II).EQ.0.)KFIX=1
C
              IF (ITYPE.EQ.3.AND.XARRAY(II).EQ.0.) KFIX=1
              IF (ITYPE.EQ.2.AND.YARRAY(II).EQ.0.) KFIX=1
              IF (ITYPE.EQ.4.AND.XARRAY(II).EQ.0.OR.ITYPE.EQ.4.AND.YARRAY(
     1II).EQ.0.) KFIX=1
  365         CONTINUE
  370       I=I-1
            II=II-1
            NPTS(K)=I
  375       CONTINUE
        IF (KFIX.EQ.1) CALL FIXUP
        RETURN
C
C                              *****FORMAT STATEMENTS*****
C
 5000 FORMAT (/51H ** NOTE: FOR A 3-D PLOT ONLY A SOLID-STRAIGHT LINE./,
     141H           IS AVAILABLE FOR ALL DATA SETS.)
 5010 FORMAT (/43H >> PLOT TITLE ( ONE LINE, 25 CHARACTERS )<,/,
     125H -------- 25 CHAR -------->)
 5020 FORMAT (/36H ** INPUT ERROR: RE-ENTER LAST LINE.)
 5030 FORMAT ()
 5040 FORMAT (5A6)
 5050 FORMAT (A1)
 5060 FORMAT (/38H >> LOGICAL UNIT NUMBER FOR PLOT TAPE<,/,
     124H    DEFAULT = UNIT "29".)
 5070 FORMAT (/38H ** THE FOLLOWING PERTAIN TO GRAPH NO.,I2,/)
 5080 FORMAT (49H >> DO YOU WANT A 3-DIMENSIONAL PLOT -- YES OR NO,
     117H (DEFAULT = 2-D)<)
 5090 FORMAT (/43H >> X AXIS LENGTH (INCHES) -- DEFAULT = 9".)
 5100 FORMAT (/43H >> Y AXIS LENGTH (INCHES) -- DEFAULT = 7".)
 5110 FORMAT (/39H >> PLOT SIZE SCALING FACTOR -- DEFAULT,14H = FULL SCA
     1LE.)
 5120 FORMAT (/43H ** INPUT ERROR: SCALING FACTOR MUST BE NON,
     110H-NEGATIVE,,/,23H    RE-ENTER LAST LINE.)
 5130 FORMAT (/51H >> DO YOU WANT A TITLE BLOCK -- YES OR NO (DEFAULT,
     113H = NO TITLE)<)
 5140 FORMAT (/51H >> GIVE  X,Y  COORDINATE (INCHES) FOR PLACEMENT OF,/,
     14X,37HTHE UPPER LEFT CORNER OF TITLE BLOCK.)
 5150 FORMAT (/43H >> YOU NOW HAVE ROOM FOR 5 LINES OF PRINT,,
     124H 25 CHARACTERS PER LINE.,/,4X,27HHOW MANY LINES DO YOU NEED<)
 5160 FORMAT (/24H >> ENTER SCRIPT FOR THE,I2,9H LINE(S):,/,
     125H -------- 25 CHAR -------->)
 5170 FORMAT (/38H >> X AXIS LABEL (25 CHARACTER LIMIT)<,/,
     125H -------- 25 CHAR -------->)
 5180 FORMAT (/38H >> Y AXIS LABEL (25 CHARACTER LIMIT)<,/,
     125H -------- 25 CHAR -------->)
 5190 FORMAT (/44H >> DO YOU WANT A GRID -- YES OR NO (DEFAULT,
     112H = NO GRID)<)
```

```
 5200 FORMAT (/46H >> SELECT ONE OF THE FOLLOWING FOR YOUR GRID:,/,4X,
     132H  -1= HORIZONTAL GRID LINES ONLY,/,4X,40H    0= HORIZONTAL AND V
     2ERTICAL GRID LINES,/,4X,30H  +1= VERTICAL GRID LINES ONLY)
 5210 FORMAT (/34H >> HOW ARE THE AXES TO BE SCALED<,/,6X,22H1 = LINEAR
     1X, LINEAR Y,/,6X,19H2 = LINEAR X, LOG Y,/,6X,19H3 = LOG X, LINEAR
     2Y,/,6X,16H4 = LOG X, LOG Y)
 5220 FORMAT (/38H >> HOW MANY SETS OF DATA ON GRAPH NO.,I2,1H<)
 5230 FORMAT (/39H >> LINE/SYMBOL COMBINATION FOR SET NO.,I2,1H:,/,4X,
     147H 0= POINTS CONNECTED BY LINE,NO SYMBOLS PRINTED,/,4X,
     248H+N= POINTS CONNECTED BY LINE, SYMBOLS PRINTED AT,/,4X,
     325H    EVERY N-TH DATA POINT,/,4X,37H-N= NO LINE DRAWN, SYMBOLS PR
     4INTED AT,/,4X,25H    EVERY N-TH DATA POINT)
 5240 FORMAT (/33H >> WHAT TYPE OF LINE FOR SET NO.,I2,1H<,/,6X,
     119H1 = SOLID,STRAIGHT ,/,6X,20H2 = DASHED,STRAIGHT ,/,6X,
     216H3 = SOLID,SMOOTH)
 5250 FORMAT (/33H >> WHAT TYPE OF LINE FOR SET NO.,I2,1H<,/,6X,
     119H1 = SOLID,STRAIGHT ,/,6X,17H2 = SOLID,SMOOTH )
 5260 FORMAT (/46H >> INTEGER EQUIVALENT OF CALCOMP SYMBOL TO BE,/,4X,
     132HPRINTED AT EACH N-TH DATA POINT<)
 5270 FORMAT (/39H >> DO YOU WANT A HISTOGRAM FOR SET NO.,I2,1H,,/,4X,
     135HYES OR NO (DEFAULT = NO HISTOGRAM)<)
 5280 FORMAT (/50H ** CAUTION: FOR A HISTOGRAM,YOU NEED ONLY SPECIFY,/,
     14X,57H       (1) A LOWER AND UPPER LIMIT FOR THE FIRST BIN, THEN,/,
     24X,54H       (2) AN UPPER LIMIT ONLY FOR EACH BIN THEREAFTER.)
 5290 FORMAT (/35H >> ADD YOUR (X,Y) DATA FOR SET NO.,I2,1H:,/,4X,
     117HEND WITH  "@EOF".)
C
      END
```

DISTRIBUTION LIST

No. of Copies	Organization
12	Commander Defense Documentation Center ATTN: DDC-TCA Cameron Station Alexandria, VA 22314
3	Director Defense Nuclear Agency ATTN: RATN Washington, DC 20305
1	Field Command, DNA Livermore Division ATTN: MAJ Brown P. O. Box 808 Livermore, CA 94550
2	DNA Information & Analysis Center TEMPO, General Electric Co. ATTN: Mr. W. Chaw Dr. Hendrick 816 State Street Santa Barbara, CA 93102
1	Commander US Army Materiel Development and Readiness Command ATTN: DRCDMA-ST 5001 Eisenhower Avenue Alexandria, VA 22333
1	Commander US Army Aviation Research and Development Command ATTN: DRSAV-E 12th and Spruce Streets St. Louis, MO 63166
1	Director US Army Air Mobility Research and Development Laboratory Ames Research Center Moffett Field, CA 94035
1	Commander US Army Electronics Command ATTN: DRSEL-RD Fort Monmouth, NJ 07703
1	Commander US Army Missile Research and Development Command ATTN: DRDMI-R Redstone Arsenal, AL 35809
1	Commander US Army Tank Automotive Research & Development Cmd ATTN: DRDTA-RWL Warren, MI 48090
2	Commander US Army Mobility Equipment Research & Development Cmd ATTN: Tech Docu Cen, Bldg 315 DRSME-RZT Fort Belvoir, VA 22060
1	Commander US Army Armament Materiel Readiness Command ATTN: DRSAR-LEP-L, Tech Lib Rock Island, IL 61299
2	Commander US Army Armament Research and Development Command ATTN: DRDAR-LCN-F, Bldg. 65 DRDAR-TSS Dover, NJ 07801
1	Commander US Army White Sands Missile Range ATTN: STEWS-TE-F White Sands, NM 88002

DISTRIBUTION LIST

No. of Copies	Organization
1	Commander US Army Armor and Engineering Board ATTN: STEBB-AD-S Fort Knox, KY 40121
2	Commander US Army Harry Diamond Labs ATTN: DRXDO-TI DRXDO-NP 2800 Powder Mill Road Adelphi, MD 20783
1	Director US Army TRADOC Systems Analysis Activity ATTN: ATAA-SL, Tech Lib White Sands Missile Range NM 88002
2	Commander US Army Nuclear Agency ATTN: MONA-WE Dr. C. Davidson 7500 Backlick Rd, Bldg 2073 Springfield, VA 22150
1	Commander Naval Surface Weapons Center Silver Spring, MD 20910
2	Director US Naval Research Laboratory ATTN: Code 7600 Tech Lib Washington, DC 20375
1	AFWL/NTN Kirtland AFB, NM 87117
1	Director Lawrence Livermore Laboratory ATTN: Mr. E. Farley P. O. Box 808 Livermore, CA 94550
1	Director Los Alamos Scientific Lab Los Alamos, NM 87544
1	Director Oak Ridge National Laboratory Neutron Physics Division P. O. Box X Oak Ridge, TN 37831
	Aberdeen Proving Ground
	Marine Corps Ln Ofc Dir, USAMSAA ATTN: Dr. J. Sperrazza L. Bain B. Lufkin Cdr, USATECOM